



# **Review of Information Technology in Virginia State Government**

**Prepared by**

**GARTNER GROUP CONSULTING SERVICES**

**for the**

**Joint Legislative Audit and  
Review Commission of the  
Virginia General Assembly**

**Commission Draft**

**November 10, 1997**

**GARTNER GROUP**  
56 Top Gallant Road  
Stamford, Connecticut 06904



## **Commission Draft**

This document is the Commission Draft of the JLARC report Review of Information Technology in Virginia State Government. Do not quote, publish, or release any material contained in this document, because it is subject to additional verification and editorial review.

**Joint Legislative Audit and Review Commission**

**November 10, 1997**



**TABLE OF CONTENTS**



## Table of Contents

1. INTRODUCTION.....	2
1.1. USE OF INFORMATION TECHNOLOGY IN VIRGINIA STATE GOVERNMENT .....	2
1.1.1. <i>Summary of Environment</i> .....	3
1.1.2. <i>Costs</i> .....	4
1.1.3. <i>Key Organizations</i> .....	10
1.2. OVERVIEW OF THE DEPARTMENT OF INFORMATION TECHNOLOGY (DIT) .....	11
1.2.1. <i>Introduction</i> .....	11
1.2.2. <i>Mission, Organization</i> .....	12
1.2.3. <i>Current Status</i> .....	17
1.3. OVERVIEW OF THE COUNCIL ON INFORMATION MANAGEMENT (CIM) .....	18
1.3.1. <i>Introduction</i> .....	18
1.3.2. <i>Mission, Organization</i> .....	18
1.3.3. <i>Current Status</i> .....	21
1.4. STUDY APPROACH AND METHODS .....	21
1.4.1. <i>Study Issues</i> .....	21
1.4.2. <i>Study Objectives</i> .....	22
1.4.3. <i>Procurement of Consultant</i> .....	23
1.4.4. <i>Study Approach</i> .....	24
1.4.5. <i>Consultant's Approach—Detail</i> .....	25
1.5. REPORT ORGANIZATION .....	34
2. OPPORTUNITIES FOR PRIVATIZATION OF TECHNOLOGY ARE LIMITED.....	37
2.1. DATA CENTER OPERATIONS SHOULD NOT BE PRIVATIZED.....	37
2.1.1. <i>Benchmarking Results—Introduction</i> .....	37
2.1.2. <i>Benchmark Results—Costs Detail</i> .....	38
2.1.3. <i>Privatization Interview Process</i> .....	51
2.1.4. <i>Privatization Interviews—Results</i> .....	52
2.1.5. <i>Data Center Privatization Conclusions</i> .....	55
2.1.6. <i>When and How to Privatize</i> .....	55
2.2. TELECOMMUNICATIONS SERVICES ARE CURRENTLY PRIVATIZED .....	65
2.2.1. <i>The Commonwealth Today</i> .....	65
2.2.2. <i>Network Outsourcing Process</i> .....	66
2.3. PRIVATIZATION MAY BE VIABLE FOR SOME SELECTED SERVICES.....	70
2.3.1. <i>Academic Outsourcing Rationale</i> .....	70
2.3.2. <i>Where Could the Commonwealth Privatize?</i> .....	70
2.3.3. <i>Desktop Outsourcing</i> .....	71
2.3.4. <i>A Uniform Decision Process is Needed</i> .....	74
3. MANAGEMENT OF INFORMATION TECHNOLOGY IN VIRGINIA STATE GOVERNMENT.....	79
3.1. BETTER MANAGEMENT OF TECHNOLOGY RESOURCES IS NEEDED.....	79
3.1.1. <i>Concerns About Costs/Budgeting / Cost Recovery</i> .....	79
3.1.2. <i>Procurement, Much Improved, Should Consider New Approaches</i> .....	81
3.1.3. <i>Long-Term View of Multiple Platforms for Mainframe Processing</i> .....	85
3.1.4. <i>Growth of Agency-Sponsored Networks</i> .....	87
3.1.5. <i>Wide Area Data Network Benchmark</i> .....	87
3.1.6. <i>Client/Server vs. Mainframes: an "OR" or an "AND"?</i> .....	98
3.1.7. <i>Inadequate Central Support for Client/Server Systems</i> .....	100
3.1.8. <i>Potential Changes in the Telecommunications Area</i> .....	101
3.1.9. <i>Proper Planning for IT</i> .....	103



3.1.10. Voice Information Processing Benchmark Results .....	105
3.1.11. Managing Package Application Implementation .....	109
3.2. MANAGEMENT OF TECHNOLOGY FOR HIGHER EDUCATION .....	112
3.2.1. Benchmarking Comparisons—Virginia Tech .....	112
3.2.2. Benchmarking Comparisons—University of Virginia .....	119
3.2.3. Different Mission and Environment .....	126
4. BLUEPRINT FOR IT STRUCTURE IN THE NEXT CENTURY .....	129
4.1. CHIEF INFORMATION OFFICER (CIO) .....	129
4.1.1. Formal Definition .....	129
4.1.2. Qualifications .....	130
4.1.3. Planning and Standards Function .....	130
4.1.4. CIO Office Summary .....	131
4.2. CREATION OF THE DEPARTMENT OF TECHNOLOGY SERVICES .....	132
4.2.1. Mission Clearly Defined .....	132
4.2.2. The New Cost Allocation Scheme .....	133
4.3. ORGANIZATION OF ADMINISTRATIVE DIRECTORATE .....	135
4.3.1. Finance Division .....	135
4.3.2. Human Resources Division .....	135
4.3.3. DTS Management Information Systems Division .....	136
4.4. ORGANIZATION OF TECHNOLOGY INFRASTRUCTURE DIRECTORATE .....	136
4.4.1. Commonwealth Data Center Division .....	137
4.4.2. Commonwealth Telecommunications Support Center .....	139
4.5. ORGANIZATION OF AGENCY SUPPORT DIRECTORATE .....	142
4.5.1. Technology Consulting Division .....	142
4.5.2. Procurement and Contracting Division .....	144
4.5.3. Virginia Geographic Information Network .....	145
4.6. SUMMARY OF CHANGES TO DIT'S STRUCTURE .....	146
4.6.1. Council on Information Management (CIM) Abolished .....	147
4.6.2. CIO Responsible for Strategic Planning .....	148
4.6.3. Agency Information Technology Managers Link Strategic and Agency Planning .....	150
4.6.4. Links to Technology Funding and Procurement .....	152
4.7. ORGANIZATION OF AGENCY INFORMATION TECHNOLOGY OPERATIONS .....	152
APPENDICES .....	157
4.1 GLOSSARY .....	158
4.2 STUDY MANDATE LANGUAGE .....	161
4.3 GARTNER GROUP OVERVIEW .....	163
4.4 REAL DECISIONS OVERVIEW .....	169
4.5 BENCHMARK DETAIL .....	172



## List of Figures

Figure 1. Five-year Cost of Ownership Model .....	10
Figure 2. Current and Proposed Structure for Information Technology Services .....	12
Figure 3. DIT Employment Trends .....	14
Figure 4. CIM Organization (Current) .....	18
Figure 5. Methodology Overview .....	25
Figure 6. Data Center Benchmark Overview .....	38
Figure 7. NOW Index Against Entire Database .....	39
Figure 8. NOW Index Against Government Organizations .....	40
Figure 9. Difference from Average by Category .....	41
Figure 10. Hardware Costs Against Government Peer Group .....	42
Figure 11. Systems Software Costs Against Government Peer Group .....	43
Figure 12. Occupancy Costs Against Government Peer Group .....	44
Figure 13. Processor Costs Against Government Peer Group .....	45
Figure 14. Staffing Levels and Costs per Person .....	46
Figure 15. Operations Headcount per MIPS .....	47
Figure 16. Percent Customer MIPS .....	48
Figure 17. Value of Work Produced per MIPS .....	50
Figure 18. Value of Work Produced .....	51
Figure 19. Growth Rates in Desktop Support Costs .....	71
Figure 20. NOW Index Against Government Peer Group .....	89
Figure 21. Distribution of Workload Value .....	90
Figure 22. Devices per Network Personnel .....	92
Figure 23. NOW Index Against Government Peer Group .....	94
Figure 24. Distribution of Workload Value .....	95
Figure 25. Devices per Network Personnel .....	97
Figure 26. Total Cost per Minute .....	107
Figure 27. Monthly Cost per Extension .....	109
Figure 28. NOW Index Against Entire Database .....	113
Figure 29. NOW Index Against Government Organizations .....	114
Figure 30. Cost Difference between Average and Virginia Tech, by Category .....	115
Figure 31. Staffing Levels and Cost per Person .....	116
Figure 32. Value of Work Produced Against Peer Group .....	117
Figure 33. Volume of Work Produced Against Database .....	118
Figure 34. NOW Index Against Entire Database .....	120
Figure 35. NOW Index Against Government Peer Group .....	121
Figure 36. Cost Difference Between Average and the University of Virginia, by Category .....	122
Figure 37. Staffing Levels and Cost per Person .....	123
Figure 38. Value of Work Produced Against Peer Group .....	124
Figure 39. Volume of Work Produced Against Database .....	125
Figure 40. Information Technology Organizational Structure .....	133
Figure 41. Use of ESPs in Client/Server Projects .....	143
Figure 42. Use of ESP Function .....	143
Figure 43. ESP Impact on Client/Server Project Implementation Time .....	144
Figure 44. DIT Structure and MEL .....	146
Figure 45. DTS Structure and MEL .....	147
Figure 46. Agency Information Technology Organization .....	154



### **List of Tables**

Table 1. IT Expenditures by State Agency, FY1996.....	4
Table 2. IT Expenditure by Educational Institutions, FY1996 .....	8
Table 3. Core Agencies.....	28
Table 4. Secondary Agencies.....	29
Table 5. Headcount Costs Summary .....	45
Table 6. Value of Work Produced .....	49
Table 7. Desktop Outsourcing Recommendations.....	74
Table 8. NOW Index Calculation.....	88
Table 9. Work Value Against Government Peer Group.....	90
Table 10. Cost Comparison (000s) .....	91
Table 11. Headcount Against Government Peer Group.....	92
Table 12. NOW Index Calculation.....	93
Table 13. Work Value Against Government Peer Group.....	95
Table 14. Cost Comparison (000s) .....	96
Table 15. Headcount Against Government Peer Group.....	96
Table 16. Voice Network Benchmark Study Parameters .....	106
Table 17. Virtual Usage per Minute .....	108
Table 18. Workload Produced at Virginia Tech .....	117
Table 19. Workload Produced .....	124
Table 20. Incremental Costs of Supporting Additional OA Suites .....	149
Table 21. Technology Services Council Meeting Topics.....	151
Table 22. Agency Information Technology Organization Responsibilities.....	155



## **CHAPTER I**

### **INTRODUCTION: Virginia's Approach to Information Technology Management and Operations**





## 1. INTRODUCTION

### 1.1. USE OF INFORMATION TECHNOLOGY IN VIRGINIA STATE GOVERNMENT

Information technology—computer processing and telecommunications—is an essential part of the operations of almost every State agency and institution. State government faces growing demands for a broad array of services to citizens and businesses. Taxpayers expect such services to be delivered in an effective, cost efficient manner. Today, the delivery of government services would likely be impossible without modern data processing and telecommunications support.

In Virginia, two agencies are primarily responsible for information technology support for State government. The Council on Information Management (CIM) is responsible for information technology planning and standards and is intended to provide for coordination of State government information technology activities. The Department of Information Technology (DIT) is responsible for provision of information technology services, including data processing, applications development and maintenance, and data and voice telecommunications. In addition, individual agencies and institutions have significant internal information technology operations.

In recent years, the ability of State government to manage its information technology resources and to effectively use emerging technologies has come into question. A perception has developed that DIT is not cost efficient in comparison with private sector providers of information technology services, for example. DIT is also seen as being slow to make available to its customer agencies new technologies which would lower costs and improve services. CIM is viewed as being unable to establish and enforce any statewide standards, or to use the information technology planning process to effectively influence agency information technology operations. All of these concerns are symptomatic of a basic, underlying problem—there is currently a lack of leadership and direction for information technology in State government. As a result, information technology in State government appears to be managed under a “chaos model,” with individual agencies moving in many different directions. This has been evidenced most recently with the development of wide area telecommunications networks by agencies, essentially in competition with the State network managed by DIT.

Against this backdrop of concern about the direction of information technology in State government, the Virginia General Assembly directed the Joint Legislative Audit and Review Commission (JLARC), with the assistance of a qualified consultant, to complete a review of information technology services for State agencies and institutions (Item 14, 1996 Appropriation Act). Gartner Group of Stamford, Connecticut was selected in a competitive procurement to complete the review. This report presents the findings and recommendations of the Gartner Group research. The report answers critical questions about the current status of information technology in Virginia government, and offers a blueprint for improved organization and management of information technology resources for the future benefit of the citizens of Virginia.



### 1.1.1. Summary of Environment

If one equates the Commonwealth of Virginia's (Commonwealth's) methods for delivering services and governance to the citizens of Virginia—its “business”—to that of private industry, one finds that many agencies and functions map into many different private industries. The Department of Accounts might represent a traditional accounting function within any private organization. The Department of General Services (DGS) might represent a traditional administrative function or a distribution company (State Warehouse). Alcohol Beverage Control might represent a retail and distribution organization. One can imagine then that the information technology (IT) needs of the Commonwealth are equally complex; in fact, the need set is more complex than that of most private organizations. Hence, these IT needs must be provided for by a variety of agencies, groups, and vendors within the Commonwealth.

A complicating issue relates to the political nature of the Commonwealth. The governor's term is four years, and a sitting governor is not allowed to succeed himself/herself. This simple fact often results in a four-year cycle of management/business activities for the Commonwealth, aligned with the four-year term of a given governor.

This cycle typically begins with the election of a governor. Commensurate with the election of a governor is a “mandate” of some type based on the general consensus of the citizens. Typically, the governor is elected with a base set of causes or issues to resolve. The new governor appoints a group of senior managers, who take responsibility for the agencies and the overall government. The appointed managers, as part of this new administration, tend to fulfill the goals outlined by this mandate.

Among other issues, the present administration and the General Assembly supported the Work Force Transition Act, attempting to realign the workforce skill set and simplify headcount with the Commonwealth's needs. Privatization issues were also examined as part of the administration's effort.

The salient point in this discussion is the interface between the new governor with the governor's mandated issue and the planning for IT. Proper IT planning requires foresight, long range investment and patience. In our review of the Commonwealth's IT environment, we discovered many instances where the interface between the planning functions for IT and the actual delivery capability for IT were less than ideal given this four-year term discussed above and other issues (Other issues, which will be discussed in more detail later in this report, include relating to the decentralized vs. centralized information provisioning of IT resources, the ability of different agencies/groups with the Commonwealth to provide planning and then implement plans, and the structure and chargeback scheme of the Department of Information Technology).



### 1.1.2. Costs

The Commonwealth's direct IT costs are approximately \$495 million per year. Table 1 represents spending for labor, services, hardware, and software for the various agencies throughout the Commonwealth (given the chargeback scheme at the Commonwealth, a portion of each agency's costs are attributable to DIT and charged-back by DIT; DIT's total expenditure of \$71.5 million is a part of some of the amounts in Table 1). More specifically, spending on IT is as follows:

**Table 1. IT Expenditures by State Agency, FY1996**

Agency	Information Technology Expenditure
Accounts, Department of	\$4,028,430.34
Administration, Secretary of	\$45,460.44
Aging, Department for the	\$72,289.88
Agriculture and Consumer Service, Department of	\$1,477,059.45
Alcoholic Beverage Control	\$4,591,195.09
Arts, Virginia Commission for the	\$11,153.18
Attorney General, Office of	\$715,757.80
Auditor of Public Accounts	\$309,566.12
Aviation, Department of	\$623,175.64
Bar Examiners, State Board of	\$4,121.37
Bar, Virginia State	\$199,769.41
Capital Police, Division of	\$48,843.62
Chesapeake Bay Commission	\$112.68
Chesapeake Bay Local Assistance Department	\$83,357.89
Chippokes Plantation Farm Foundation	\$446.58
Circuit Courts	\$2,328,170.47
Combined District Courts	\$551,784.69
Commerce and Trade, Secretary of	\$52,801.98
Commission on Youth, Virginia	\$823.80
Commonwealth's Attorneys' Services Council	\$27,964.49
Compensation Board	\$418,238.14
Conservation and Recreation, Department of	\$1,393,854.08
Correctional Education, Department of	\$1,457,856.88
Corrections, Department of	\$9,660,849.03
Corrections, Department of	\$109,262.21



Agency	Information Technology Expenditure
Court of Appeals of Virginia	\$113,004.20
Crime Commission, Virginia State	\$8,153.88
Criminal Justice Services, Department of	\$813,169.80
Deaf & Hard of Hearing, Department for the	\$247,113.93
Economic Development, Department of	\$881,815.23
Education, Department of	\$3,498,360.09
Education, Secretary of	\$53,358.08
Elections, State Board of	\$1,489,439.18
Emergency Services, Department of	\$632,065.45
Employee Relations Counselors, Department of	\$43,148.00
Employment Commission, Virginia	\$10,180,981.66
Environmental Quality, Department of	\$2,748,103.48
Finance, Secretary of	\$7,492.60
Fire Programs, Department of	\$225,644.05
Forestry, Department of	\$871,724.33
Frontier Culture Museum of Virginia	\$61,500.14
Game and Inland Fisheries, Department of	\$1,637,869.21
General District Courts	\$1,234,645.16
General Services, Department of	\$3,095,269.38
Governor's Commission on Government Reform	\$7,782.83
Governor's Employment & Training Department	\$251,692.74
Governor's Office	\$130,037.42
Gunston Hall Plantation	\$18,876.25
Health and Human Services, Secretary of	\$42,094.50
Health Professions, Department of	\$502,046.62
Health Services Cost Review Council, Virginia	\$23,327.19
Health, Department of	\$12,473,497.97
Higher Education for Virginia, State Council of	\$1,034,713.72
Historic Resources, Department of	\$130,605.54
House of Delegates	\$571,606.72
Housing and Community Development, Department	\$503,839.07
Housing Study Commission, Virginia	\$1,318.03
Human Rights, Council on	\$14,317.36
Information Management, Council on	\$288,410.42



Agency	Information Technology Expenditure
Jamestown-Yorktown Foundation	\$202,798.78
Joint Commission on Health Care	\$10,983.61
Joint Legislative Audit & Review Commission	\$50,946.07
Judicial Inquiry and Review Commission	\$4,950.29
Juvenile and Domestic Relations District Courts	\$648,125.40
Labor & Industry, Department of	\$504,433.87
Legislative Automated Systems, Division of	\$621,360.03
Legislative Services, Division of	\$64,470.46
Liaison Office, Virginia	\$8,362.61
Library & Archives, Virginia State	\$1,614,462.47
Lieutenant Governor, Office of	\$22,985.54
Local Government, Commission on	\$8,690.31
Lottery, Department of	\$16,954,530.59
Magistrate System	\$108,602.03
Marine Resources Commission	\$296,680.01
Medical Assistance Services, Department of	\$19,715,910.34
Mental Health, Mental Retardation and Substance Abuse Services, Department of	\$7,880,697.05
Military Affairs, Department of	\$658,296.55
Milk Commission	\$11,217.75
Mines, Minerals & Energy, Department of	\$891,773.97
Minority Business Enterprise, Department of	\$92,564.08
Motor Vehicles, Department of	\$21,282,845.19
Museum of Fine Arts, Virginia	\$444,839.63
Museum of Natural History, Virginia	\$55,973.89
Natural Resources, Secretary of	\$17,356.95
Parole Board, Virginia	\$250,911.26
People with Disabilities, Virginia Board of	\$17,354.39
Personnel and Training, Department of	\$1,146,935.80
Planning & Budget, Department of	\$765,718.37
Population Growth and Development, Commission on	\$4,393.97
Port Authority, Virginia	\$464,370.78
Professional & Occupational Regulation, Department of	\$1,151,727.79
Public Defender Commission	\$486,854.13
Public Safety, Secretary of	\$15,009.55



Agency	Information Technology Expenditure
Racing Commission, Virginia	\$40,638.67
Rehabilitation Center for the Blind, Virginia	\$31,219.64
Rehabilitative Services, Department of	\$4,006,141.10
Retirement System, Virginia	\$1,755,822.22
Rights of Virginians with Disabilities, Department for	\$64,572.72
Science Museum of Virginia	\$173,423.38
Secretary of the Commonwealth	\$77,095.93
Senate of Virginia	\$502,189.31
Social Services, Department of	\$36,595,136.72
Southwest Virginia Higher Education Center	\$57,234.67
State Corporation Commission	\$8,242,176.19
State Internal Auditor, Department of the	\$13,095.46
State Police, Department of	\$7,629,850.65
Supreme Court of Virginia	\$380,396.02
Taxation, Department of	\$8,702,046.79
Transportation, Department of	\$31,438,432.36
Transportation, Secretary of	\$3,657.39
Treasury Board	\$267.51
Treasury, Department of	\$541,103.36
Va. Veterans' Care Center Board of Trustees	\$2,990.83
Veterans Affairs, Department of	\$103,788.62
Virginia Alcohol Safety Action Program	\$87,754.14
Virginia Code Commission	\$476.13
Virginia Criminal Sentencing Commission	\$46,312.20
Virginia Worker's Compensation Commission	\$293,524.29
Visually Handicapped, Department for the	\$1,228,119.73
Youth and Family Services, Department of	\$1,981,787.42

Source: Commonwealth of Virginia



**Table 2. IT Expenditure by Educational Institutions, FY1996**

Education Institution	Information Technology Expenditure
Blue Ridge Community College	\$531,906.46
Central Virginia Community College	\$672,454.08
Christopher Newport University	\$2,710,441.11
Dabney S. Lancaster Community College	\$391,498.57
Danville Community College	\$1,022,776.88
Eastern Shore Community College	\$174,948.34
George Mason University	\$13,408,468.25
Germanna Community College	\$334,484.86
J. Sargeant Reynolds Community College	\$2,387,850.11
James Madison University	\$11,233,522.40
John Tyler Community College	\$661,690.34
Longwood College	\$3,453,334.17
Lord Fairfax Community College	\$731,505.87
Mary Washington College	\$5,249,153.15
Mountain Empire Community College	\$426,285.87
New River Community College	\$991,185.52
Norfolk State University	\$3,558,436.32
Northern Virginia Community College	\$4,648,659.69
Old Dominion University	\$16,258,489.79
Patrick Henry Community College	\$572,354.32
Paul D. Camp Community College	\$666,663.70
Piedmont Virginia Community College	\$501,629.36
Radford University	\$5,185,960.64
Rappahannock Community College	\$327,884.03
Richard Bland College	\$443,652.43
Southside Virginia Community College	\$708,958.07
Southwest Virginia Community College	\$907,804.62
Thomas Nelson Community College	\$860,519.52
Tidewater Community College	\$3,167,020.21
University of Virginia	\$58,558,253.81
Virginia Commonwealth University	\$32,080,044.35
Virginia Community College System	\$2,474,573.37



Education Institution	Information Technology Expenditure
Virginia Highlands Community College	\$363,387.95
Virginia Military Institute	\$1,485,149.06
Virginia Tech	\$48,660,973.73
Virginia State University	\$4,530,076.42
Virginia Western Community College	\$1,708,732.05
William & Mary, College of	\$9,913,618.38
Wytheville Community College	\$559,915.75

Source: Commonwealth of Virginia

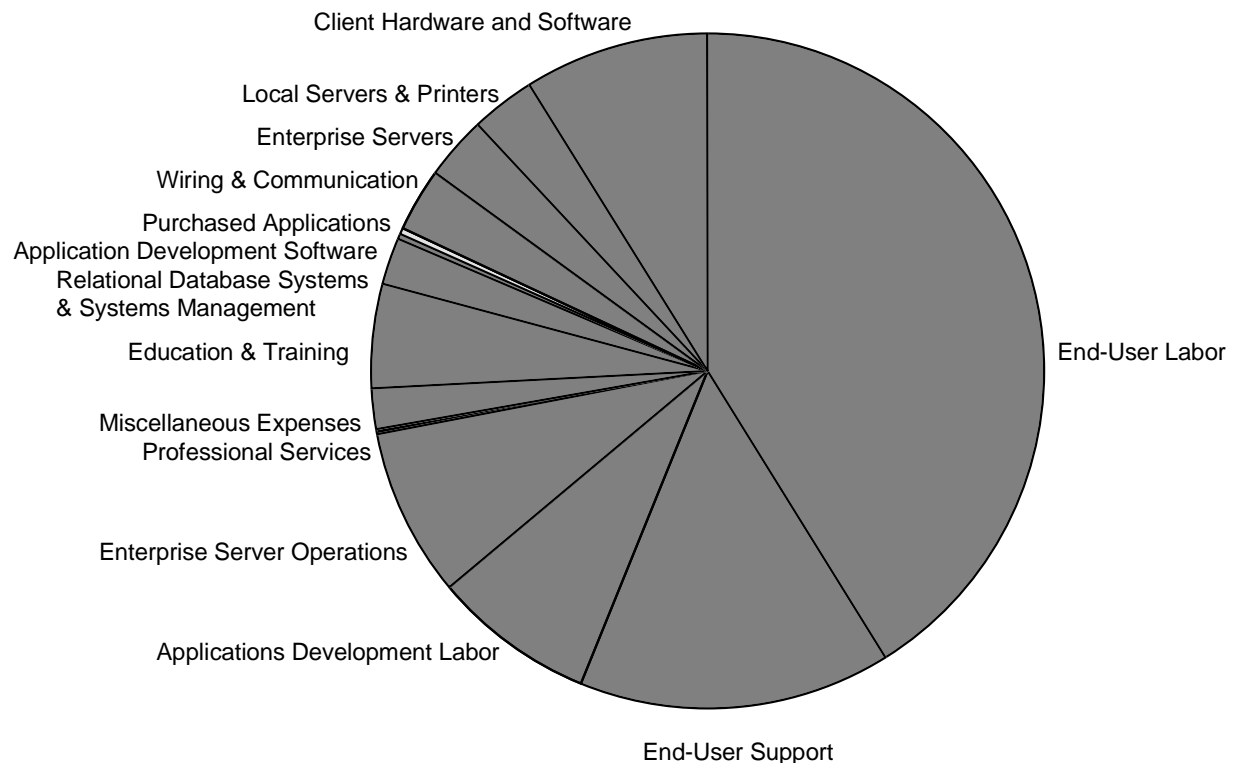
These expenditures represent a significant portion of the overall spending of the Commonwealth. Appropriate management and execution of the IT strategy for the Commonwealth is hence required in an environment where spending is of concern.

While these levels represent monitored and tracked spending in IT, it should be noted that these figures do not represent the true amount spent on IT. Much effort, and hence money, is spent supporting IT which is not well documented. These costs are incurred when end users assist other end users, lost time/lost productivity/opportunity costs of “systems not working” and costs not captured in CARS as IT related. Many of these costs are referred to as end-user labor costs.

Figure 1 below, provides an illustration of this issue. Gartner Group (engaged to assist JLARC in this study) has developed a five-year cost of ownership model for computing (it is a generic model, not specific to the Commonwealth). This model identifies and quantifies the spending associated with many different categories of IT. Most of the categories for computing are self explanatory. A list of the less recognizable categories are provided below:

- Enterprise Servers—refers to large/mainframe systems
- Wiring & Communications—refers to the physical infrastructure and to the communications costs
- RDB & Systems Management—refers to expenditures on relational database systems and to systems management
- Professional Services—refers to lawyers fees, other professional services
- End-User Labor—refers to the end-users’ support of the IT resources.





Source: Gartner Group

**Figure 1. Five-year Cost of Ownership Model**

This figure for all Gartner clients identifies the costs associated with client/server computing, with the end-user labor component at 41 percent. The computing model for the Commonwealth is a mix of both traditional mainframe and client/server; the end-user labor expenditure figure associated with mainframe computing, according to Gartner Group, is closer to 25 percent. We take the more conservative figure of 25 percent for further discussion. Again, end-user labor applies to the cost of the end-user performing IT functions of some type, which are not considered part of this person's position description.

We calculate that the real spending on IT for the Commonwealth, when accounting for all goods, services and labor, is approximately \$900 million. Clearly, this is a significant expenditure. By the year 2000, we expect that the Commonwealth will be spending over \$1 billion on IT. This represents a tremendous figure and one which must be monitored and audited to ensure that funding is spent judiciously.

### 1.1.3. Key Organizations

There are two principle organizations in State government responsible for providing IT capability and resources. The first, and principle, is DIT. This department provides two significant processing environments, an IBM mainframe complex and a Unisys mainframe environment. Both of these operations would be characterized as significant.



DIT also provides external consultative services, for hire, to the Commonwealth agencies via the Systems Development Division, the Technology Consulting Division and the Information Engineering Division. Other divisions provide operations, automated operations support and security. A full description of the DIT is provided below.

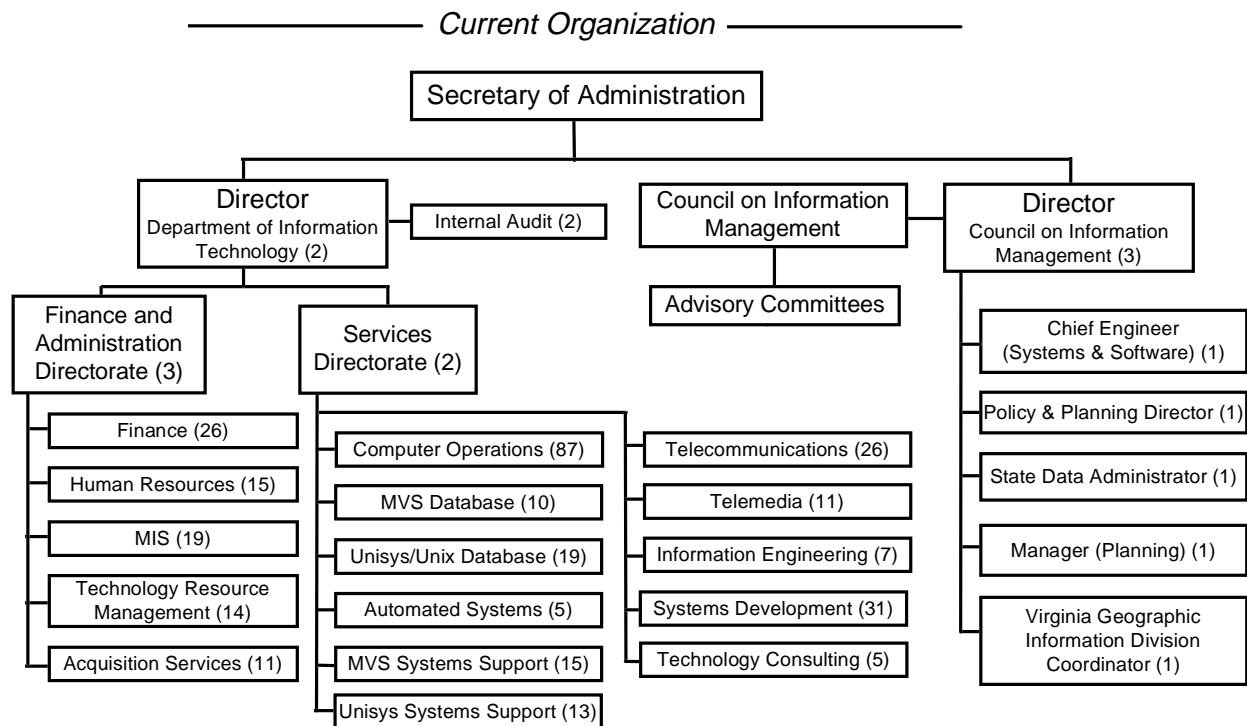
The other principle organization at the Commonwealth is the Council on Information Management, otherwise known as CIM. CIM is the planning and standards-setting body for IT for the entirety of the Commonwealth. In particular, CIM's mission is to direct IT spending and implementations throughout the Commonwealth. CIM incorporates external IT leaders through its council, which meets on a regular basis. This arrangement, in concept, serves to pollinate the Commonwealth with modern IT concepts and technology.

Most of the major agencies within the Commonwealth also have IT capability and hence organizations. Taxation, Alcohol Beverage Control and Transportation, among others, have substantive IT organizations.

## **1.2. OVERVIEW OF THE DEPARTMENT OF INFORMATION TECHNOLOGY (DIT)**

### **1.2.1. Introduction**

The DIT was created when the General Assembly merged the Department of Computer Services and the Department of Management Analysis and Systems Development. This was officially performed on September 1, 1984. The Department of Telecommunications merged with these organizations on January 1, 1985. Consolidation of these agencies was a challenging task, and required the integration of several traditional agency functions, such as human resources, budgeting and procurement, with the mission-centric activities such as computer operations and applications development. The current organization of DIT is shown in Figure 2.



Source: DIT

**Figure 2. Current Structure for Information Technology Services**

(Staff positions shown in parentheses)

### 1.2.2. Mission, Organization

Specifically, the DIT was formed through the legislative action of the 1984 Virginia General Assembly under Title 2.1, Chapter 35.2 of the Code of Virginia. The legislative action mandated the merging of the Department of Computer Services and the Department of Management Analysis and Systems Development by September 1, 1984, and the merging of the Department of Telecommunications by January 1, 1985.

The DIT's legislated authority is to provide effective and efficient IT services to the Commonwealth. Its role consists, primarily, of the following responsibilities:

- Manage and coordinate the various telecommunications facilities, centers and computer processing operations used by the Commonwealth.
- Develop and deploy an Internet strategy to promote the use of such technology, including intranet and extranet deployments, throughout the Commonwealth.
- Provide technical education and systems engineering assistance to State agencies.
- Develop and implement information technology (IT) which will aid State agencies in forecasting their needs and managing their resources.



- Formulate policies, standards and specifications for telecommunications, automated data processing and management IT.
- Review and approve agreements and contracts for communications equipment and services.
- Establish and maintain liaison with the Center for Innovative Technology to incorporate new technological tools in the public sector.
- Assist in legacy budget planning and cost estimating for all DIT services and recommend budget levels for computing services, telecommunications services and systems development services.

DIT offers computer services to its customer agencies through two distinct technologies:

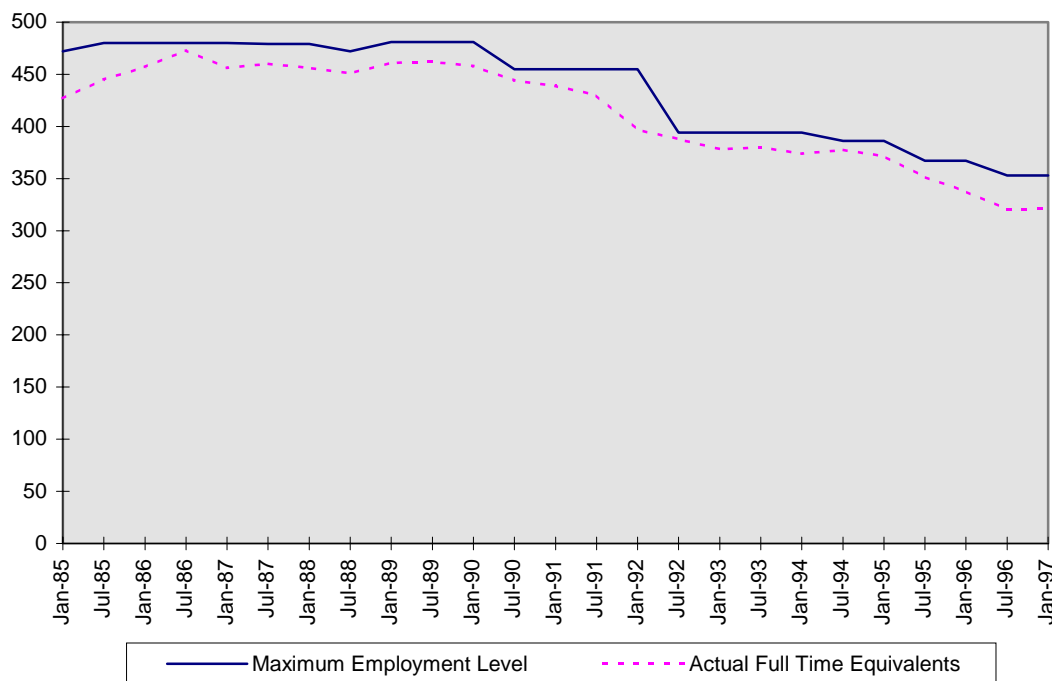
- IBM Technology—IBM 9021–900 (quantity–2) MVS/ESA supporting Virginia TechAM, Complex Instruction Set Computer (CISC), COMPLETE, information management system (IMS), ADABAS, DB2, ORACLE, ROSCOE and TSO.
- Unisys Technology—Unisys 2200/9444OS-2200 (EXEC 8) supporting CMS, TIP, DMS 1100 and MAPPER.

Telecommunications services offered include use of a virtual private network (VPN) for long distance service, Central Exchange (Centrex) local telephone services, data network design, voice and video teleconferencing, satellite communications, telecommunications systems planning and evaluation, and the servicing of all telecommunications orders for the Commonwealth.

Systems development services offered include the general design, project management, analysis, programming, documentation and maintenance of batch and online automated IT using the various access methods, program products and data structure techniques available at the DIT.

The DIT operates under the leadership of a Director who is appointed by the Governor. The Director reports to the Governor's Secretary of Administration.

Within the Department, there are currently 367 full-time positions. Figure 3 shows the trend of DIT position from 1985 to 1996. Organizationally, the DIT is comprised of the Director's Office, Internal Audit Office, the Services Directorate (twelve divisions) and the Finance and Administration Directorate (five divisions). Functional descriptions of duties within each Directorate are at the division level unless funding variances within the division dictate branch level discussion.



Source: DIT

**Figure 3. DIT Employment Trends**

The following is a description of each division and its responsibilities:

#### **1.2.2.1. Director's Office**

The Director's Office is responsible for the overall management, direction and control of the DIT.

#### **1.2.2.2. Internal Audit Office**

The Internal Audit Office is responsible for assisting all members of the DIT management to effectively discharge their responsibilities by providing them with objective analyses, appraisals, recommendations and pertinent comments concerning activities reviewed.

#### **1.2.2.3. Finance and Administration Directorate**

##### **1.2.2.3.1. Finance Division**

The Finance Division provides accounting, financial reporting, internal production and contract administration, and financial analysis services to all DIT departmental programs.

##### **1.2.2.3.2. Human Resources Division**



The Human Resources Division is responsible for the management of the human resources program, public relations, internal training, career development and technical presentations for the DIT.

#### **1.2.2.3.3. Management Information technology Division**

The Management Information technology Division provides full life-cycle systems development services for DIT internal application systems. Additionally, it develops and maintains an information resource management plan for DIT to ensure the quality, reliability and responsiveness of DIT's internal application systems.

#### **1.2.2.3.4. Technology Resource Management Division**

The Technology Resource Management Division provides internal budgeting support, recommendations for customer budgets, develops and maintains the DIT Cost Allocation Plan to support customer charging methodologies, and provides capacity planning analysis and procurement planning in support of DIT computer and telecommunications services.

#### **1.2.2.3.5. Acquisition Services Division**

The Acquisition Services Division is responsible for internal support on IT procurements, statewide telecommunications procurement services, and provides consulting services to agencies for IT procurements. It conducts IT procurements in accordance with the Commonwealth's Agency Procurement and Surplus Property Manual and the Virginia Public Procurement Act.

### **1.2.2.4. *Services Directorate***

#### **1.2.2.4.1. Technology Consulting Division**

The Technology Consulting Division provides consulting services for microcomputer hardware, software and applications, local area networks, micro to mainframe communications, and client/server technology.

#### **1.2.2.4.2. Security Division**

The Security Division provides training and assistance to customer agency security officers and it administers the DIT security program including contingency planning, information security and physical security.

#### **1.2.2.4.3. Systems Development Division**

The Systems Development Division provides centralized automated systems applications development services to all agencies and institutions within the Commonwealth. Services include general design, project management, systems analysis, programming, documentation and maintenance of automated batch and online systems. These services span mainframe,



midrange and microcomputer environments.

#### **1.2.2.4.4. Telecommunications Division**

The Telecommunications Division is responsible for the management and coordination of the Commonwealth's local and long distance voice services and dedicated, switched, frame relay and router data network services.

#### **1.2.2.4.5. Telemedia Division**

The Telemedia Division is responsible for providing satellite services ordering, scheduling, and contract administration, audio and video teleconferencing as well as telemedia applications consulting to all State agencies and institutions in the development of educational offerings. The Division also provides professional support to the Virginia Public Telecommunications Board and carries out the Board's policies and programs.

#### **1.2.2.4.6. Computer Operations Division**

The Computer Operations Division is responsible for the operation of the State computer center providing general utility and data management software products to support batch processing, online processing and remote job entry in an IBM and Unisys mainframe environment. The Unix systems acquired as part of the IHRIS and ADAPT projects also resides within this group.

#### **1.2.2.4.7. MVS Data Base Division**

The MVS Data Base Division is responsible for providing database support services for customers utilizing DIT's mainframe services. Currently, these support services include the installation, maintenance, performance and problem management of ADABAS, IMS and DB2 database software and related products.

#### **1.2.2.4.8. Unisys/Unix Data Base Division**

The Unisys/Unix Data Base Division supports two functions. This division is responsible for providing database support services to customers utilizing the Unisys mainframe. Software supported on the Unisys mainframe for database functions includes DMS 1100 and Unisys 2200 MAPPER.

The Unix support includes Unix Internet Services, Internet Mail and News Feed, and the Lotus Message Switch.

#### **1.2.2.4.9. Automated Systems Division**

The Automated Systems Division is responsible for the implementation and operation of Automated Operations software (such as the Control products



from New Dimension Software), and Storage Management software (such as Systems Managed Storage and Hierarchical Storage Manager from IBM and Tape Management System from Computer Associates). In addition, the Automated Systems Division is responsible for all IBM DASD space allocations and management.

#### **1.2.2.4.10.MVS Systems Software Support Division**

The MVS Systems Software Support Division is responsible for the installation, stability, performance and integration of the IBM operating system software, teleprocessing software, CISC, and all program products related to these systems, including TCP/IP, Virginia Tech AM and NCP software.

#### **1.2.2.4.11.Unisys Systems Software Support Division**

The Unisys Systems Software Support Division is responsible for the selection, installation, maintenance, availability and performance management of the operating systems, program products, systems utilities, and teleprocessing systems software required for the effective utilization of the Unisys 2200 mainframe computer. In addition, this division is responsible for software installation and configuration support of DIT's router services.

#### **1.2.2.4.12.Information Resource Management Division**

The Information Resource Management Division is responsible for Commonwealth NetServer management, and for providing technical assistance in developing business analyses, IT strategic plans, and information resource management plans.

### **1.2.3. Current Status**

Managing an IT environment such as that in Virginia State government is a difficult and demanding task. To do so effectively requires detailed knowledge of the activities and business functions at each of the agencies, and an ability to apply this knowledge to modern IT equipment and services and render a cost-effective, productivity enhancing IT solution.

This wide need set results in solutions provided by DIT which are deemed adequate by most of the agencies interviewed. In particular, the data center operation yields favorable reviews when the agencies were asked to assess the quality of particular DIT operations.

There were, however, concerns expressed regarding DIT and the services provided. Many agencies expressed concerns over the telecommunications services provided. The concerns covered several areas, and included issues relating to service rates, flexibility of offerings, and other issues.





The intention of this report is to outline some needed improvements to the DIT structure and operation in an effort to build upon those areas which are performing functions with quality and efficiency, and to render changes to those areas requiring improvements.

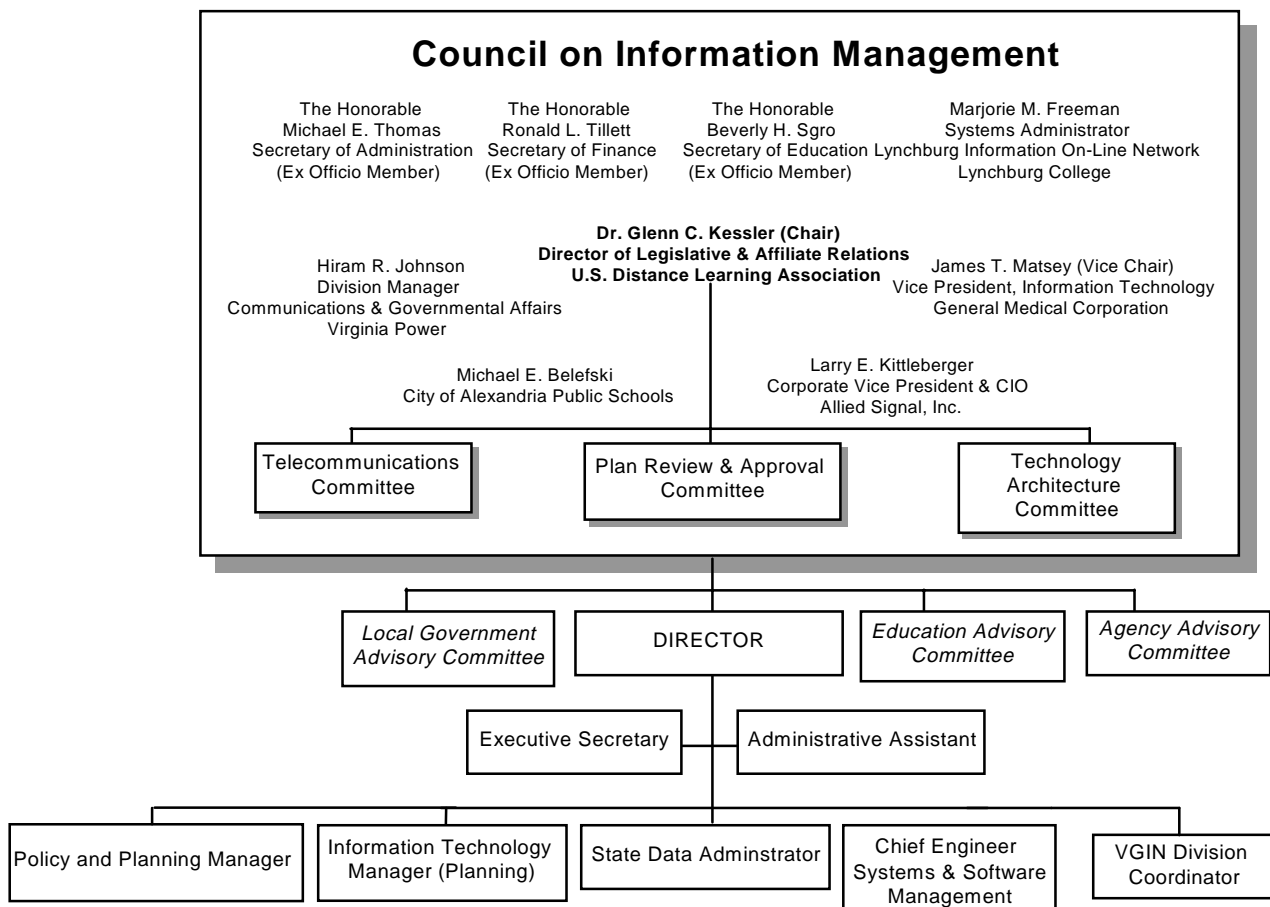
### 1.3. OVERVIEW OF THE COUNCIL ON INFORMATION MANAGEMENT (CIM)

#### 1.3.1. Introduction

The CIM was created in the late 1980s in response to a perceived lack of planning and standardization throughout the Commonwealth.

#### 1.3.2. Mission, Organization

The duties of the CIM include activities to address the manner in which the Commonwealth will use IT resources for making government more responsive and productive.



Source: CIM

Figure 4. CIM Organization (Current)



The CIM is responsible for five distinct areas:

- Planning
- Policies, Standards and Guidelines
- Budget Review
- Procurement of IT Products
- Inventory of IT Resources
- Virginia Geographic Information Network.

Detail on these five areas is provided as follows:

#### **1.3.2.1. Planning**

In 1992, the CIM approved a planning process which encompasses several of its mandated responsibilities; namely to:

- Develop a comprehensive statewide plan, which is to be updated annually, for the acquisition, management and use of IT resources.
- Review and approve agency and institution information management plans, evaluating their relative compatibility with strategic directions established in the statewide plan.
- Support the work of the agency's three advisory committees whose responsibilities include advising CIM on such plans.
- Monitor trends and advances in IT.

Statewide Plan. The CIM has established a 15-member task force composed of agency and institution representatives to assist in reviewing and evaluating the existing IT planning process as well as the development of a statewide plan to replace the existing one completed in 1993. This process is expected to be intensive, requiring extensive staff support and document technology.

Information Management Plans. Eighty-seven of the 88 agencies subject to the requirement for submission of plans to the CIM did so in 1995. CIM estimates that the average time required to review such plans ranges between four hours and 16 hours.

Advisory Committees. Two of the three advisory committees meet on a monthly basis with the third one meeting at least once every two months. The meetings require written notification, document preparation and, generally, a minimum of two staff members in attendance.

IT Monitoring. Due to a limited training budget, CIM staff members rely on secondary resources such as vendors and published reports for up-to-date information on trends and advances in IT. While extremely valuable, such resources require time to locate and evaluate.



#### **1.3.2.2. Policies, Standards and Guidelines**

Since 1990, when CIM instituted a process for developing and adopting policies, standards and guidelines, 23 documents have been issued. In 1995, the CIM determined that nine of these documents needed to be revised and updated. Policies, standards and guidelines undergo a rigorous process of review prior to their adoption. This process, lasting usually over a four to six month period, demands considerable staff resources. This same process is to be applied to any which are subject to revision.

#### **1.3.2.3. Budget Review**

The success of strategic planning depends, in large part, on successfully maximizing IT resources and identifying those initiatives that will reap the largest benefits to the Commonwealth. In the past, CIM has worked with the Department of Planning and Budget in establishing funding priorities. It is expected that this process will continue.

For the 1996–98 budget development and review process, CIM staff members reviewed 81 IT budget requests totaling over \$382 million.

#### **1.3.2.4. Procurement of IT Products**

Oversight of IT resource planning without a similar focus on implementation would have limited benefit to the Commonwealth. The CIM has, therefore, been mandated with duties responding to this need:

- Monitor implementation of information management plans.
- Develop an approval process to ensure that all IT procurements conform to the statewide information management plan and the information management plans of agencies and institutions of higher education.

Hardware or software purchases of \$50,000 or greater or equipment leases of \$2,000 per month or greater require written approval from CIM. This approval is based on certification provided by CIM that the proposed procurements are in compliance with agency plans.

During a six-month period ending December 1996, 216 requests were reviewed by the staff, having a combined value of \$216 million and each having an average turnaround time of one day.

#### **1.3.2.5. Inventory of IT Resources**

Planning for IT requires the ability to assess the current environment. To facilitate this, CIM developed and maintains an inventory of IT resources created or acquired by the Commonwealth's agencies and institutions.

#### **1.3.2.6. Virginia Geographic Information Network**

This division was established in July of 1997, and is responsible for fostering the creative utilization of geographic information and to oversee the development of a



catalog of GIS data available in the Commonwealth.

### **1.3.3. Current Status**

The view toward the CIM is mixed within the Commonwealth today. Many of the individuals Gartner Group interviewed expressed concern over the lack of authority the CIM has in enforcing its mandate and directives. While the intent of the CIM is to direct many aspects of the IT environment for the Commonwealth, its directives have no legislated authority. For example, the CIM has issued several directives during its tenure as an organization, but it is not in a position to make tactical decisions in support of this decision. Hence, the directives fail to be implemented completely.

One important strategic decision made by the CIM was in regard to the Unisys mainframe environment. CIM issued a directive on March 31, 1995 which would reduce its usage to only one agency, the Department of Social Services. To be sure, at this point in time, the Commonwealth is moving many applications off of the Unisys environment. Many of the major agencies had or have applications using MAPPER, DMS1100 and other Unisys proprietary applications and have or are migrating the applications and technology employed to alternative environments. But many applications remain on the Unisys environment, and these applications are still years away from migration off to other platforms.

While the continued use of the Unisys mainframe is an issue, Gartner Group's point is to demonstrate the difficulty the CIM has had implementing a directive based upon its current structure.

Our data collection efforts also revealed a small contingent that supported the CIM initiatives and approach. The CIM had developed a strategic planning process for IT and has, through this process, created a planning mechanism which incorporates the IT needs at both the agency and Commonwealth level. These plans have been incorporated into an overall planning document for IT in the Commonwealth.

The CIM has been able to review any capital or project plan requiring funding of more than \$50,000 in an effort to control and influence spending on technology. Also, the CIM has encouraged the creation of an asynchronous transfer method (ATM) network.

## **1.4. STUDY APPROACH AND METHODS**

### **1.4.1. Study Issues**

The critical issue regarding this study is overall policy regarding the Commonwealth's computing and telecommunications. How are IT services provided? Who provides them? What spending level is reasonable? Many IT organizations within the agencies were created and expanded in response to the increased investment in this same technology, and without standards for management, organization or placement. This lack of foresight and increased investment yield concerns about the IT environment at



the Commonwealth. The issue of privatization was also raised as a possible solution to increased IT costs.

Further, the following issues are core to this engagement.

- How should IT services be provided to the Commonwealth agencies?
  - Core processing activity—are centralized computing resources available to all executive branch agencies
  - Agency-by-agency processing—processing capability in the agencies specific to each agency
  - Telecommunications, voice and data—provision for providing data and voice services
- How should the Commonwealth plan for its IT services in the future?
  - Governance policy and approach—command and control of the telecommunications services
  - Centralized vs. decentralized—extent that services are centralized or decentralized
- Would privatization of any of the Commonwealth's IT services be appropriate? Under what circumstances?

#### **1.4.2. Study Objectives**

The specific objectives of this engagement are as follows:

- I. Perform an analysis of the structure providing computer and telecommunications services to State agencies.
  - Analyze the existing structure—perform a systematic review of all computing and telecommunications services, whether in-house or externally provided. This review includes structure, costs, IT-funding and management processes.
  - Identify alternative structures—identify alternative structures for providing IT services, including advantages/disadvantages, agency impact and implementation time frame. Alternatives to be examined include more centralized structures and more decentralized structures; these options are examined against varying service-providing options.
- II. Analyze IT planning and standards
  - Assess current strategic planning—perform an analysis of the statutory authority and the capability of the planning groups.
  - Evaluate IT standards—evaluate the need for standards, the authority for setting standards, the effectiveness of the CIM and the impact of extending these standards at the local government level.
  - Analyze the mission of the CIM—analyze roles/responsibilities, organizational



placement, DIT and other agency relationship and effectiveness. Also, indicate alternatives or modifications needed.

### III. Evaluate the feasibility and advisability of privatizing DIT services

- Evaluate existing DIT services—perform an assessment of the scope, utility, efficiency and effectiveness of the data services. Subjects include hardware and software in use, center consolidation and other parameters. This will include an audit of a financial benchmarking being completed for DIT.
- Evaluate existing telecommunications services—perform an assessment of the scope, utility, efficiency and effectiveness of the telecom services, including a Direct Service Plan analysis, cost comparisons to other states, billing practices and an FTS 2000 contract evaluation.
- Privatization analysis—analyze the various forms of privatization and its impact upon the Commonwealth. This includes various permutations of the following options: state/private ownership, centralized/decentralized, single/multivendor, etc.
- Privatization impact assessment—perform an impact assessment, examining privatization's effect on State agencies, costs, availability, privacy, level of service, etc.
- Cost analysis—perform a cost analysis and comparison of the in-house service provisioning and the outsourced service provisioning.
- Mitigation—develop a method for minimizing and mitigating the risks associated with any outsourced function.

The Commonwealth's three primary needs (as detailed in the Request for Proposal [RFP]) are mirrored in the objectives above.

#### 1.4.3. Procurement of Consultant

While the degree of IT knowledge within JLARC is extensive, JLARC management believed that in order to fulfill the requirements of the engagement, an external consultant with specific IT expertise should be contracted. An experienced consultant would possess specific resources and knowledge necessary to successfully handle the study requirements.

An RFP was issued July 22, 1996 to begin the recruitment process. Bids were received from six well-known consulting organizations by August 22, the bid due date. A thorough review of the bids and initial scoring yielded a finalist set of two. A more formal evaluation of the two finalists was made, including a presentation from the two bidders which took place in September.

After a final evaluation and scoring session, Gartner Group was selected as the external consultant. Negotiations moved forward in early October, and a contract was issued at the end of the month.



#### 1.4.4. Study Approach

The Virginia General Assembly directed that an external consultant with specific information technology expertise be retained to complete a review of information technology and that the Joint Legislative Audit and Review Commission hire the consultant and supervise the work. An extensive search for consultants was conducted by JLARC, starting with the issuance of a RFPs. Six initial respondents were pared down to two after the initial scoring. Formal presentations of the proposals from the two finalists yielded a decision to use the Gartner Group for the study.

Gartner Group's study approach drew from a broad array of skills and services in the company and was composed of three major components:

- Gartner Group Consulting Services (GGCS)—A consulting team was assembled to perform the majority of the effort associated with the review.
- Real Decisions (RD) Benchmarks—Real Decisions, a subsidiary of the Gartner Group, performed three traditional data center benchmarks. The benchmarks were performed for the DIT data center and the data centers at the University of Virginia and Virginia Tech. These studies allowed Gartner Group and JLARC to develop a detailed quantitative view of the operation of the State's major data centers. Additionally, Real Decisions performed a wide area data benchmark and a voice information processing benchmark to diagnosis the data and voice networking environment and the management capability in place in State government.
- External Services Providers Government (ESPG) Continuous Service—This service focuses on information technology issues affecting federal, state, and local governments. Use of ESPG provides insight into the capabilities of external service provider organizations and helps subscribers to understand how privatization might proceed via these service organizations.

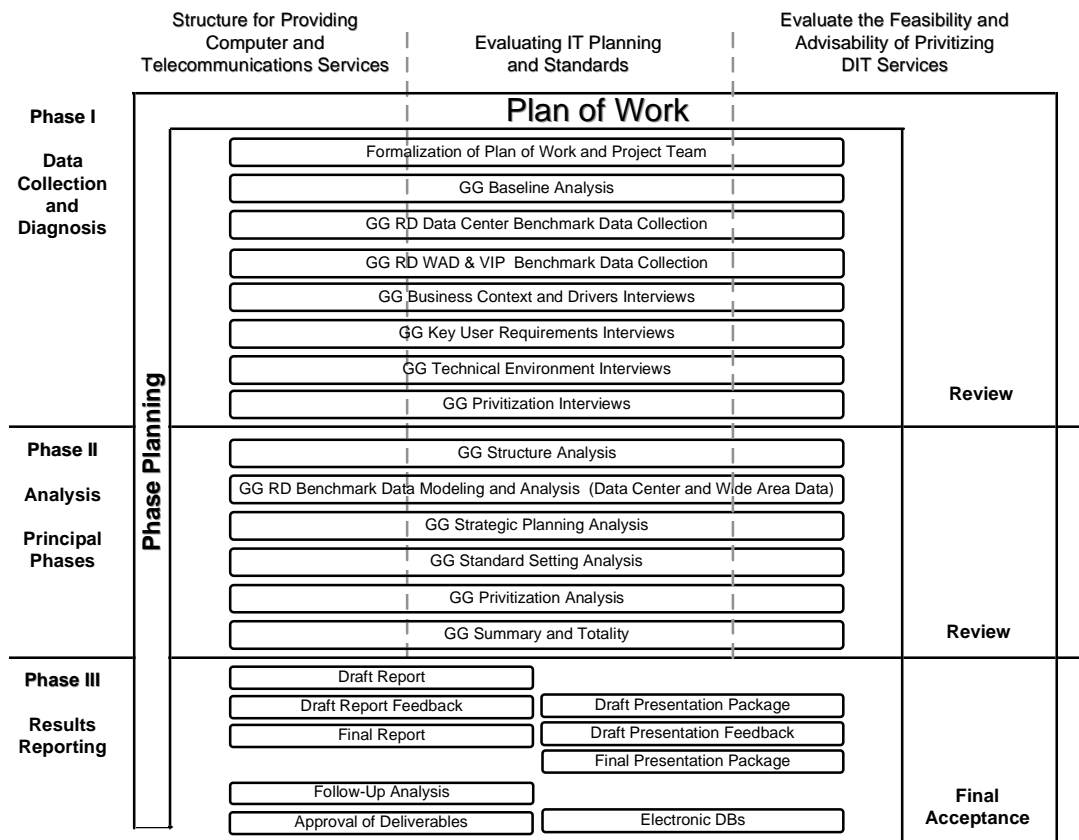
The Gartner Group research was completed in three phases. The first phase was data collection and diagnosis, and included a baseline analysis to examine the existing information technology environment, data collection for the five Real Decisions benchmark analyses, individual and focus group interviews, and site visits to a sample of agencies. Analysis of the data was conducted in the second phase, and included a structure/governance analysis, benchmark modeling and analysis, planning and standards analysis, and the privatization review. The third phase was reporting, and involved the development of findings and recommendations by the consulting research team.

This report is an overview of the findings and recommendations of the full Gartner Group report. Key issues relate to privatization of the DIT data center, management of information technology resources for the benefit of State agencies and institutions, and a revised structure for the management of information technology resources in State government.



This continuous service, while not an integral part of the engagement, provided a backdrop for all interviews, data collection efforts and analysis activities.

Figure 5 provides a summary of the engagement methodology.



Source: Gartner Group

**Figure 5. Methodology Overview**

#### 1.4.5. Consultant's Approach—Detail

The following provides detail on our approach to this engagement:

##### 1.4.5.1. Task—Formalization of Plan of Work and Project Team

Gartner Group's methodology relied heavily on a teaming approach between Gartner Group and many members of the State government community. In this task, we worked with project management to design the client project team structure and roles and to identify the individuals whose participation would eventually be solicited.

Additionally, a detailed Plan of Work was assembled which indicates key data collection sessions, meetings, deliverables and other project events. In particular, the plan of work included:





- Specific tasks to be performed
- Expected duration and person-hour necessary
- Sequence in which the tasks will be performed
- Milestone dates
- Staff assigned to the tasks.

Per the RFP, the plan was initially presented in the fall of 1996 for review and acceptance by JLARC staff. Then, the plan was formally accepted and work began immediately.

Also per the RFP, a formal presentation of the work plan was made to JLARC. This presentation took place in May, and represented both a view back and forward into the JLARC/Gartner Group activities from September 1996 until November 1997.

### **Phase 1. Data Collection and Diagnosis**

The data collection efforts were comprehensive and thorough. Given the wide set of tasks and deliverables to be completed and given the number of individuals and groups involved in the interview process, this phase was the lengthiest part of the engagement.

#### **Task 1. Information Baseline Analysis**

This task provided the information regarding standards-by-use and standards-by-decree, facilitating our understanding of the standards-setting process for the Commonwealth.

The Gartner Group team provided models and assisted in a detailed survey of the current technology infrastructure of the Commonwealth. The Gartner Group technology baseline survey collected information, via the interview process, in the following areas:

##### **Computing Infrastructure**

- Operating systems (e.g., desktop/GUI, application server, mainframe, etc.)
- Middleware (e.g., OLTP, DBMS gateways, etc.)
- Application technologies (e.g., source languages, 4GL, CASE tools, etc.)
- Database technologies (e.g., DBMS, file systems, etc.)

##### **Network Infrastructure**

- Infrastructure services (e.g., CNOS, directory services, gateways, etc.)
- Enterprise network (e.g., LAN topologies, WAN topologies, etc.)
- Security technologies (e.g., authentication, encryption, etc.)
- Network and systems management (e.g., NSM tools, asset management, etc.)

##### **Applications Services**



- Messaging utility (e.g., workgroup, backbones, etc.)
- Workgroup technologies (e.g., personal productivity, collaboration, etc.)
- Electronic commerce (e.g., Internet, Web, Electronic Data Interchange [EDI], etc.).

### **Task 2. Real Decisions Data Center Benchmark Data Collection**

The Real Decisions Benchmark Data Center commenced with the distribution of the data collection template and forms. These forms were distributed to the three data centers' production and management personnel for review and completion. The three data centers included were:

- DIT
- Virginia Tech
- University of Virginia

Gartner Group personnel assisted with the completion of the documents as was required. This process required more time than was originally anticipated. Given the centralized processing yet decentralized use of data center services in the Commonwealth, many more individuals than planned were required to take an active part in the completion of the documents.

### **Task 3. Real Decisions Wide Area Data Benchmark Data Collection**

The Real Decisions Wide Area Data Benchmark commenced with the distribution of the data collection template and forms. These forms were distributed to key network and network management personnel for review and completion.

Gartner Group personnel assisted with the completion of the documents as was required. As with the data center benchmark processes, this effort required more time than was originally anticipated. Given the centralized processing yet decentralized use of wide area data telecommunications services in the Commonwealth, many more individuals were required to take an active part in the completion of the documents than originally anticipated.

### **Task 4. Real Decisions Voice Information Processing Benchmark Data Collection**

The Real Decisions Voice Information Processing Benchmark commenced with the distribution of the data collection template and forms. These forms were distributed to key voice and voice management personnel for review and completion.

Gartner Group personnel assisted with the completion of the documents as was required. As with the other benchmark efforts, this effort required more time than was originally anticipated. Given the centralized processing yet decentralized use of voice telecommunications services in the Commonwealth, many more individuals were required to take an active part in the completion of the documents than originally anticipated.



## Diagnostic Interviews

The Gartner Group team consisted of a subset data collection group which performed the diagnostic interviews. These interviews gave Gartner Group the opportunity to understand the structure, process, planning and personnel in the Commonwealth, and assisted us in all three components of the engagement. The balance of Phase 1 tasks comprise the diagnostic interviews.

### **Task 5. Business Context and Drivers Interviews**

Gartner Group conducted both one-on-one interviews and facilitated focus group sessions with key Commonwealth unit/line management and senior staff in order to develop, document and prioritize key business drivers.

Specifically, the Gartner Group team divided the agency set into two separate groups, termed core and secondary. The core agencies represented the largest agencies within the Commonwealth as it relates to IT use. These core agencies are listed below in Table 3.

**Table 3. Core Agencies**

Department of Social Services
Department of Transportation
Department of Motor Vehicles
Department of Medical Assistance Services
Department of Health
Virginia Employment Commission
Department of Corrections
Department of Taxation
Department of Mental Health, Mental Retardation and Substance Abuse Services
Department of State Police
Department of Accounts
Department of General Services

Source: Gartner Group

The secondary agencies represent significant users of IT, but not at the same level as the Core Agency Group. The secondary agencies are listed below in Table 4.



**Table 4. Secondary Agencies**

Department of Lottery
State Corporation Commission
Alcoholic Beverage Control
Department of Rehabilitative Services
Department of Education
Circuit Courts
Department of Juvenile Justice
The Library of Virginia
State Board of Elections
Department of Agriculture and Consumer Services

Source: Gartner Group

In general, any agency with spending greater than \$5 million was considered to be core; any agency between \$5 million and approximately \$1 million was considered to be secondary. Agencies with spending under the \$1 million level were considered reference.

The data collection needs were the same with either the core or secondary agencies, but Gartner Group's approach was somewhat different. Relative to this task, the interviews were intended to establish business context and key business drivers focus. More specifically, we looked for the following items:

- Corporate strategy as it relates to IT requirements
- Satisfaction with current information services
- Critical applications
- Perceived value of information services
- Operations, administration or management needs
- Changes anticipated in business operation and structure
- Growth patterns.

Key focus areas we focused on include:

- Budget process and overview—process, individuals involved, controls
- Effectiveness of current policies, procedures, practices and procurement responsibilities.

### **Task 6. Key User Requirements Interviews**

Using both the group interview and individual interview techniques outlined above, Gartner Group attempted to uncover key user requirements. For the core agency group,



both one-on-one interviews and focus groups were conducted. For the secondary groups, only focus group interviews were conducted.

Interviews to establish user requirements focused on:

- Communications requirements (both internal and external)
- Need for, and identification of, particular services
- Which needs are being met today, and how, and which are not met, and why
- Computing technology resident in each business unit and its strengths and weaknesses
- Applications accessed by a business unit and their strengths and weaknesses.

Key focus areas we are concerned with include:

- Linkage of statewide strategic planning and IT planning
- Future key application areas.

### **Task 7. Technical Environment Interviews**

Gartner Group facilitated focus groups and one-on-one interviews with key DIT IT unit/operational line management and senior staff (including applications development, database administration, operations and support) to document common tactical systems/technology needs and priorities.

The Gartner Group team conducted individual interviews with key Commonwealth senior IT management to document common strategic technology/systems needs and priorities. The Deputy Director of DIT, and the two Directorate Heads at DIT were included on this list.

Key focus areas Gartner Group concerned itself with include:

- CIM—current role, responsibilities, technical awareness, clout, authority
- Data center operation—size, skills, role, technical specifics
- Strategic planning analysis—where, who, effectiveness, timeliness, technology-mapped
- Telecommunications—scope, utility, efficiency and effectiveness.

### **Task 8. Privatization Interviews**

It was critical to clearly and completely identify the requirements of all major IT stakeholders in order to make the correct decision regarding privatization as a possible alternative. The primary IT stakeholders are:

Core agency staff—the involvement of representatives from the finance, accounting, auditing, human resources and legal departments (or designates) in each of the large agencies was key. Each area has important requirements; for example, expected



financial returns, audit requirements of supplier relations, human resource notification and transfer constraints, as well as legal precedents and concerns.

Key users—major clients must also be involved in whatever solution is proposed. Typically, these issues revolve around the internal customers of the IT service, but in some cases it is appropriate to involve the external customers as well. Customer requirements tend to revolve around service cost and quality, data confidentiality and customer service.

DIT—the importance of this group cannot be underestimated. It is essential that an outsourcing solution supports IT strategic plans, as well as shorter-term tactical needs. The issues related to retaining key personnel and ensuring complete cooperation with the evaluation and subsequent transition were examined as early as possible in the process.

Data were collected through a series of interviews with key stakeholders in the privatization decision process. Typically, the privatization interviews were conducted with each professional that Gartner Group met. This ensured total coverage of the privatization issue at the Commonwealth.

#### **1.4.5.2. Data Collection Summary**

Due to the size of our data collection effort, some of our interviews and group sessions had more than one purpose; a given interview may have had a privatization focus and a strategic planning focus.

A small number of interviews were conducted via telephone due to scheduling conflicts or geographic locations rendering face-to-face interviews impractical. We estimate that approximately one-half of the interviews involved members of the IT organization; key customer representatives or program staff comprised the remainder.

### **Phase 2. Analysis**

While the data collection and diagnosis phase of the engagement was composed of many separate tasks, the analysis phase began the process of forming our opinions, insights and recommendations along the lines of the requirements spelled out in the RFP.

#### **Task 1. Structure Analysis**

In this task, we sought to identify strengths and weaknesses in the current IT structure. This includes DIT services, vendor services, IT support at colleges and universities, and budgeting/funding. The ESPG analysts provided insight toward current practices at other state agencies. From this analysis, several scenarios emerged: centralized vs. decentralized, insourced vs. outsourced, etc.



In this task, we also conducted an analysis of the CIM. This analysis resulted in recommendations regarding its authority, the Commonwealth's concept vs. other states', and its future role and responsibility.

## **Task 2. Real Decisions Benchmark Data Modeling and Analysis**

Once the data were collected for both the Data Center and Wide Area Data Benchmarks, our Real Decisions analysts reviewed the information for completeness, accuracy and realism. Any changes deemed necessary by the analysts were arranged in person or on-site. This task required a great deal of effort—collecting the correct data was particularly difficult in the Commonwealth environment.

Once the data were certified, it was modeled against and into the benchmark databases. These databases constitute information from all our past client activities, making them statistically significant. It is from these databases that Gartner Group compared information and obtain the necessary detail to form our opinions regarding privatization.

The Data Center Benchmark measures the relative costs, performance and quality of the total workload processed in the data center facility as compared to the operations of peer government entities. Specifically, this study analyzes annual operating expenditures, reviews staffing levels and evaluates the current customer product delivered by unit cost and workload composition. Capacity utilization, service and quality levels, and overall volumes produced are also included in the analysis.

The Wide Area Data and Voice Information Processing Benchmark evaluates the financial resources and the workload delivered for both data and voice. Four primary elements—transmission facilities, hardware, software and personnel—comprise the cost models, and combined with the number of work units supported, establish the parameters for evaluation.

Once the information was collected and analyzed, we developed real parameters on the effectiveness of the data centers and networks examined. Of even more importance is the mapping of this data against the data collection and diagnosis, to arrive at overall conclusions regarding the IT service groups within the Commonwealth.

The critical metric in the Real Decisions Benchmark is termed the NOW Index. This index is a quotient of workload costs (normalized) divided by workload delivered. The workload delivered is calculated based upon Gartner Group standards for each component examined (CPU minute, transmission sites, etc). The normalized cost is simply the cost incurred by a particular agency. Hence, the higher the NOW Index the less efficient the organization.

It is important to note that this index relates to the operating efficiency at DIT and does not include the indirect component of the chargeback scheme. Layering in this chargeback layer more accurately represents the charges incurred at the agency level,



but clouds Gartner Group's view of the true efficiency of DIT.

### **Task 3. Strategic Planning Analysis**

Strategic planning means different things to different people. To some, a strategic plan for IT is a detailed blueprint for the acquisition, development, deployment and retirement of IT assets over a multiyear time horizon. Others view IT strategy as a vision with directional statements and broad and detailed guidelines that provide a framework for operational or tactical decisions.

The concept of IT strategy advanced in this proposal is closer to the second view than the first. More specifically, Gartner Group views IT strategy as analogous to a business plan for the core IT group. Just like any business, IT groups have markets (clients and customers); suppliers; value-added services; and partners and competitors, both within and external to the enterprise. The objective of a business plan is to provide a rationale for the acquisition of resources and the development of effective processes and organizations. More to the point, business plans are designed to secure funds, whether from venture capitalists, investment bankers or enterprise management.

Our analysis, then, for strategic planning, was to evaluate the Commonwealth against this model, essentially performing a gap analysis to flush out shortcomings and inadequacies. The resultant is a set of recommendations regarding the Commonwealth's strategic planning process.

### **Task 4. Standards Setting Analysis**

The Gartner Group consulting process requires that each architecture component is decomposed into a set of specific elements. Each element is defined by the following key issues:

- Industry position—each technology element (and process element where appropriate) is discussed based on industry status and outlook. The status is based on availability of standards (e.g., formal or de facto), vendors and products, both emerging and currently deployed.
- Baseline—the current technology or process elements in use by an organization.
- Retirement—technology and/or process elements targeted for de-investment during the architecture planning horizon (e.g., five years).
- Containment—technology and/or process elements targeted for limited (maintenance or current commitment) investment during the architecture planning horizon.
- Mainstream—technology and/or process elements targeted as the primary deployment/investment option for new systems or legacy system migration over the architecture planning horizon.
- Emerging—technology and/or process elements to be evaluated for future integration into the target architecture (e.g., mainstream) based on technology





availability and business need (a key for evergreening).

Based upon this model as our guide, we developed a set of recommendations for the Commonwealth's standards-setting process.

### **Task 5. Privatization Analysis**

A rational decision to transfer IT services to another party requires a thorough understanding of the strengths and weaknesses of DIT. This means clarifying the services that are currently provided, as well as their cost and quality. The primary motivation for selecting a commercial vendor to provide these services is that the vendor can provide the same functions for lower cost and/or higher quality. The difference between the current in-house process and the proposed vendor solution should be great enough to offset the significant financial and emotional costs involved in evaluating outsourcing as an alternative.

The data collected in the two Real Decisions Benchmarks and the privatization interviews were analyzed in order to form a conclusion about the viability of proceeding further. The documentation had to present a compelling case for the selected sourcing option, as well as set the stage for further action. The potential benefits of outsourcing must be weighed against the risks, as each pertains to the unique requirements of the Commonwealth. Analyses across several dimensions had to be synthesized into a coherent recommendation. It was very important to identify outstanding issues that must be addressed in order to arrive at a successful sourcing option. Finally, the nature, sequence and timing of action items had to be presented in order to gain commitment for the sourcing alternative selected.

### **Task 6. Summary and Totality Analysis**

In this last analysis task, Gartner Group convened a series of internal workshops and meetings with Real Decisions analysts, ESPG and Gartner Group analysts and consulting team members. The objectives of these workshops were to 1) formalize our many recommendations and alternatives, 2) reconcile any differences in analysis or recommendations, and 3) develop a final high-level summary for use in the presentation package.

### **Phase 3. Reporting and Presentation**

The final phase represents both our written and oral presentations to the Joint Legislative Audit and Review Commission after an exposure draft has been reviewed by relevant state agencies. The final report is to be briefed in November, 1997.

### **1.5. REPORT ORGANIZATION**

Chapter I has presented basic information on IT in Virginia State Government and an overview of Gartner's analysis and methods. Chapter II examines issues related to privatization. Issues related to improved management of IT resources are addressed in



the third chapter. Finally, Chapter IV proposes a new structure for the information technology services of State government.



**CHAPTER II**

**OPPORTUNITIES FOR  
PRIVATIZATION ARE LIMITED**



## **2. OPPORTUNITIES FOR PRIVATIZATION OF TECHNOLOGY ARE LIMITED**

This section of the report begins our analysis and findings relative to the privatization question. The specific question posed by this study was whether specific IT operations should be privatized, or possibly outsourced. Our analysis of the situation leads us to believe that cost (cost savings) was the primary motivator for considering privatization and quality was secondary, but still important.

Before proceeding, a proper definition of terms is appropriate. Privatization is the act of taking a state government function/activity/process/operation and spinning it off into its own private viable enterprise. This enterprise would likely be for profit and perhaps already in the IT business; the Commonwealth's operation would be additive. There are many reasons such an event would occur, the two most important being cost savings and improved quality. Both would occur, it is believed, as a result of the focus a private concern would have on the business of providing IT capability. The assets, both capital and human, are transferred to the new concern as part of the transition.

Outsourcing is a superset of the privatization notion. As with privatization, an operation of some kind is closed in the Commonwealth environment and those lost functions are picked up by a private concern of some type. Again, the motivations are typically driven by quality and cost savings. Unlike the privatization transition, the outsourcing transition does not necessarily imply that the assets migrate to the private concern. In many cases, however, people and capital transition to the private concern.

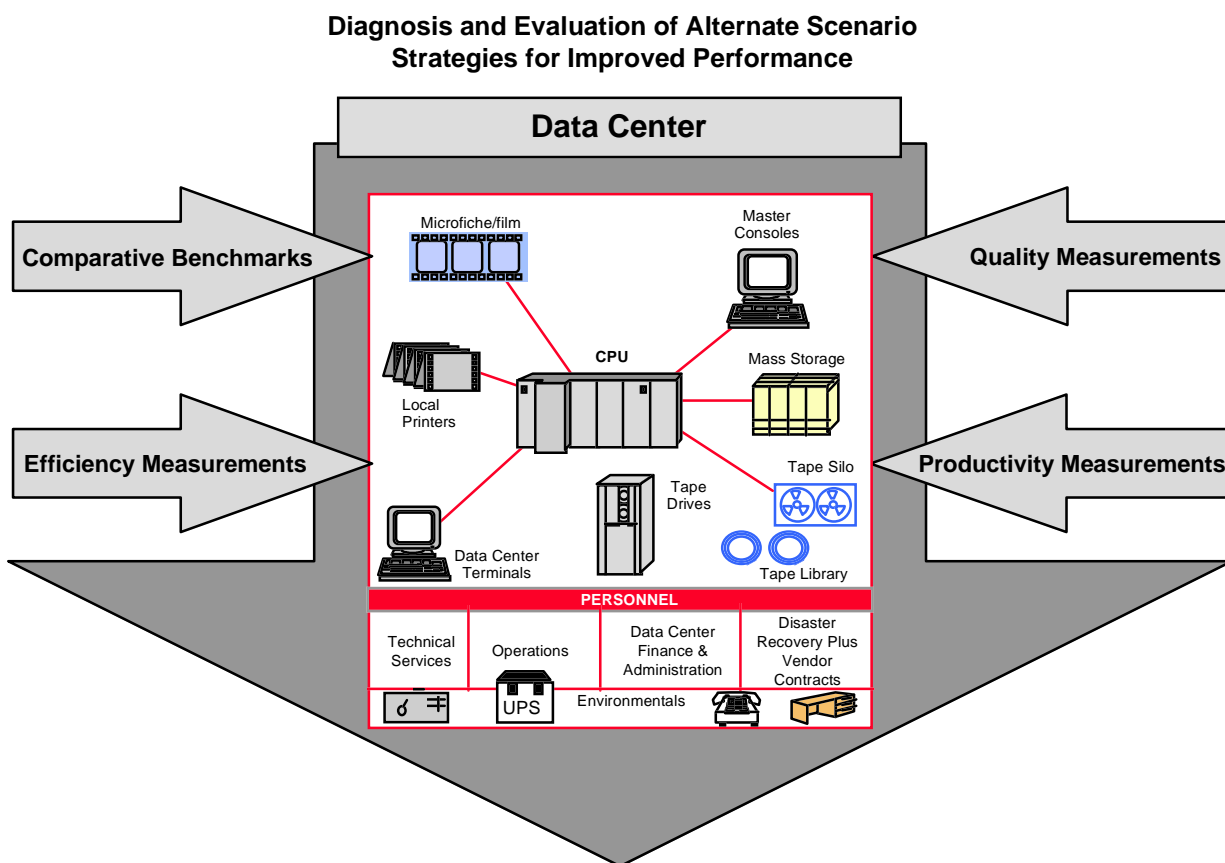
### **2.1. DATA CENTER OPERATIONS SHOULD NOT BE PRIVATIZED**

Our analysis pertaining to the data center operation was straightforward and detailed. The data center benchmark performed yielded interesting results and is summarized below. When combined with the results of our privatization interviews, the resultant conclusion was that the data center operation should not be privatized.

#### **2.1.1. Benchmarking Results—Introduction**

In this section of the report, we will present the results of the Real Decisions Benchmark Data Center Benchmark for the DIT data center. We will present several charts and graphs which describe the environment and issues involved.

The Data Center Benchmark measures the relative cost, performance and quality of the total workload processed by the DIT facility as compared to the operations of similar organizations. The results enable improvement of the IT operation by comparing the DIT facility to those within the database of leading-edge IT organizations. Figure 6 below presents a summary of the benchmark methodology.



Source: Real Decisions

**Figure 6. Data Center Benchmark Overview**

The Real Decisions database is recognized as the premier source of current, accurate, comparative IT metrics. The overall capabilities and unit cost-efficiency are represented by the NOW Index, a proprietary rating of data center performance, which is defined as follows:

NOW Index = Normalized Cost/Work Produced

## **2.1.2. Benchmark Results—Costs Detail**

### **2.1.2.1. Now Index of Entire Database**

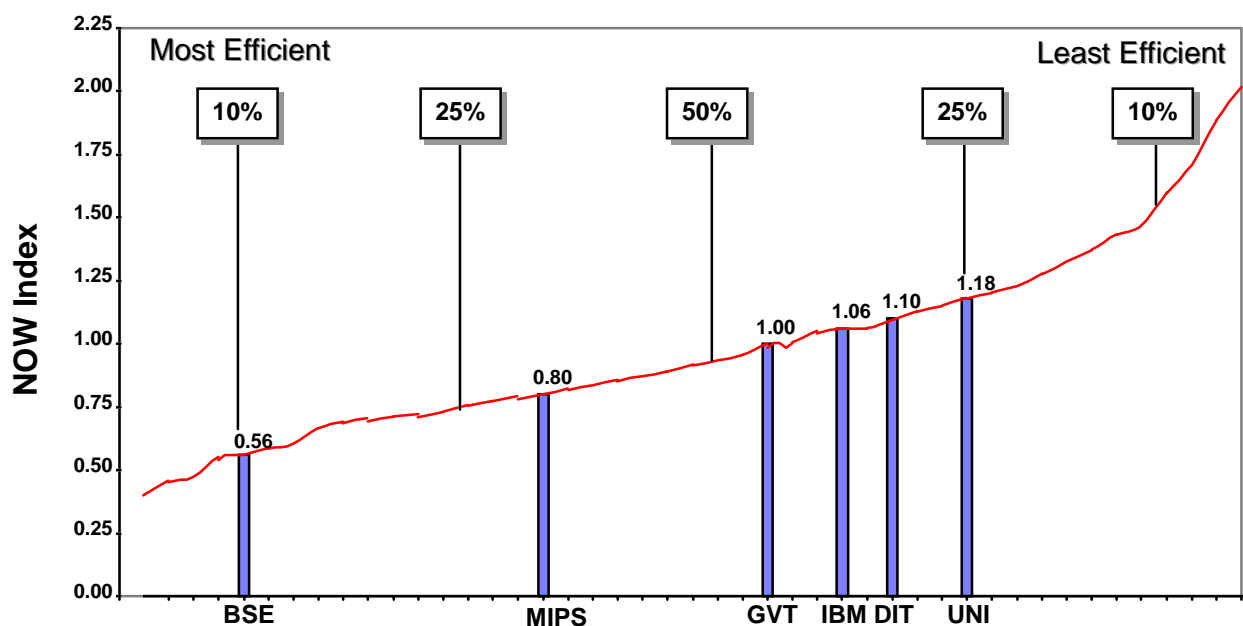
Figure 7 represents the NOW Index of the DIT data center viewed against the entire database of companies surveyed. Gartner Group utilized comparison groups in an effort to illustrate other unit's efficiency, as represented by the NOW Index. These comparison or peer groups represent averages of a set of data centers with similar characteristics. Definitions of the comparison's groups are as follows:

- Government (denoted by "GVT")—seven installations with an installed (million instructions per second) MIPS size of between 301 and 673 MIPS. The average



size is 454 MIPS. There are three state governments represented.

- MIPS (denoted also as “MIPS”)—fourteen installations with an average capacity of 597 MIPS. Two Government installations. This one uses a comparison of data centers based upon similar size.
- Best standard of efficiency (denoted by “BSE”)—six installations with an average installed capacity of 611 MIPS.
- IBM—represents the IBM mainframe complex at DIT.
- DIT—represents a combination of the IBM and Unisys environment at DIT.
- UNI—represents the Unisys mainframe complex at DIT.



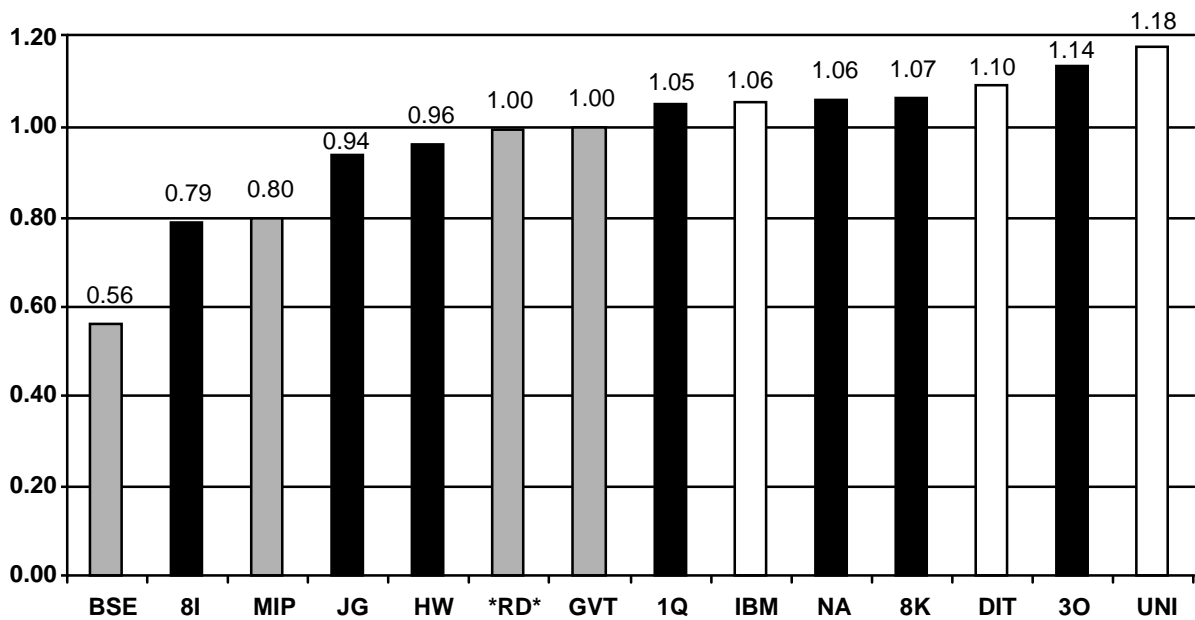
Source: Real Decisions

Figure 7. NOW Index Against Entire Database

The benchmark reveals a higher NOW Index, and hence lower overall efficiency rating, for the overall DIT complex than the government peers and the MIPS/similar size complex peers. The IBM complex, with a NOW Index of 1.08, is relatively efficient. This statistic is significant, and is indicative of a fairly well-run data center operation (IBM). The Unisys environment, with a NOW Index of 1.18 is less efficient, and constitutes an area of concern.

#### 2.1.2.2. NOW Index Against Government Peer Group

Figure 8 provides a view of DIT, IBM and UNI against other specific governmental organizations. The intent is to provide a more granular view of the DIT operation against its peers. The entities BSE, MIP and RD (overall average) are also represented.



Source: Real Decisions

**Figure 8. NOW Index Against Government Organizations**

Figure 8 demonstrates the concern Gartner Group has for the Unisys environment. It has the highest NOW Index in the peer group. Again, we view the IBM environment as having minor challenges to be dealt with while overall being a fairly well run data center operation.

### **2.1.2.3. Difference Between Average and Commonwealth, by Category**

In Figure 9 below, we examine the difference in several different cost categories between the Commonwealth and the peer group average. For the purposes of this benchmark, we calculated the average using the GVT group. This exercise affords us the opportunity to examine, in detail, variances between the “standard” and DIT.

This figure is read as a percentage of the GVT peer group average. A cost reading of 55 percent, for example, indicates that this particular entity costs 55 percent of the GVT peer group average. This level would represent a value significantly less (goodness). The far right column gives the difference in dollars for the combined IBM and Unisys environment. Note also that the Unisys and IBM environments are shown, as is the combined.

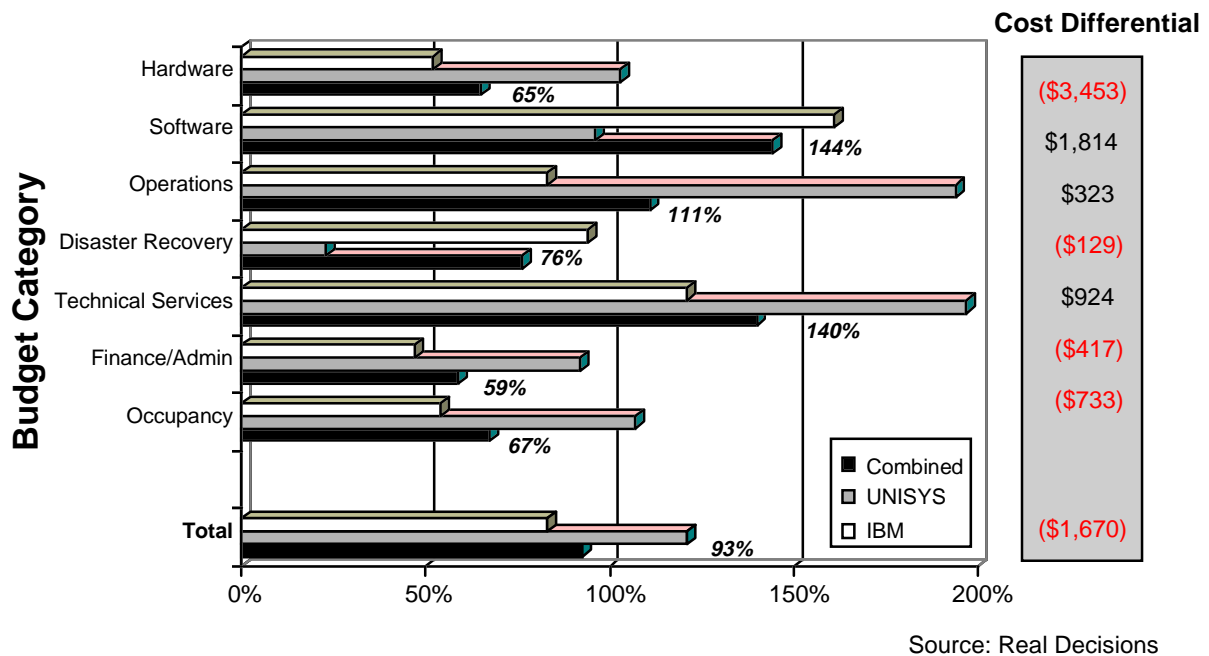


Figure 9. Difference from Average by Category

Figure 9 above, illustrates several interesting points. The hardware costs, on the IBM side, are low in comparison to GVT. This points to the age of the hardware and the accounting means by which the hardware is treated (many commercial concerns depreciate the hardware and hence have costs every year). Even the Unisys hardware environment is reasonable.

In the operations area, we see that the IBM environment is quite low in comparison to GVT. With Unisys, the costs are quite high, based upon the cost of labor, allocation of operators between the two environments, and the proprietary nature of the Unisys environment.

Our data collection efforts did not include an extensive review of the disaster recovery plans at DIT; our cursory overview demonstrates the adequacy of these plans. It is difficult, therefore, to comment on the disaster recover cost analysis from the benchmark except in general: The issue of disaster recovery is essentially one of willingness to accept risk. An organization can choose to spend little on disaster recovery if it is willing to accept a computing outage of several days or even longer.

The next area of concern is the technical services area. For both environments and the combined, the costs are higher than the average of GVT. Gartner Group's data collection activities pointed to the requirement placed upon DIT to support multiple versions/releases of systems software. Several database management systems and versions within products (CISC as an example) are required given the diversity of the processing at the Commonwealth. This diversity leads to increased costs as DIT is forced to respond to the requirements of its constituency.





The last two categories, finance/administration and occupancy, again point to the efficiency developed in the IBM arena and the high costs encountered with the proprietary Unisys environment; the IBM environment demonstrates lower cost and the Unisys higher.

#### 2.1.2.4. Hardware Costs Detail Against Government Peer Group

Figure 10 below, provides an additional level of detail for the hardware category examined previously. Again, we examine the IBM, Unisys and combined environment against the governmental group, which is taken as the 100 percent level.

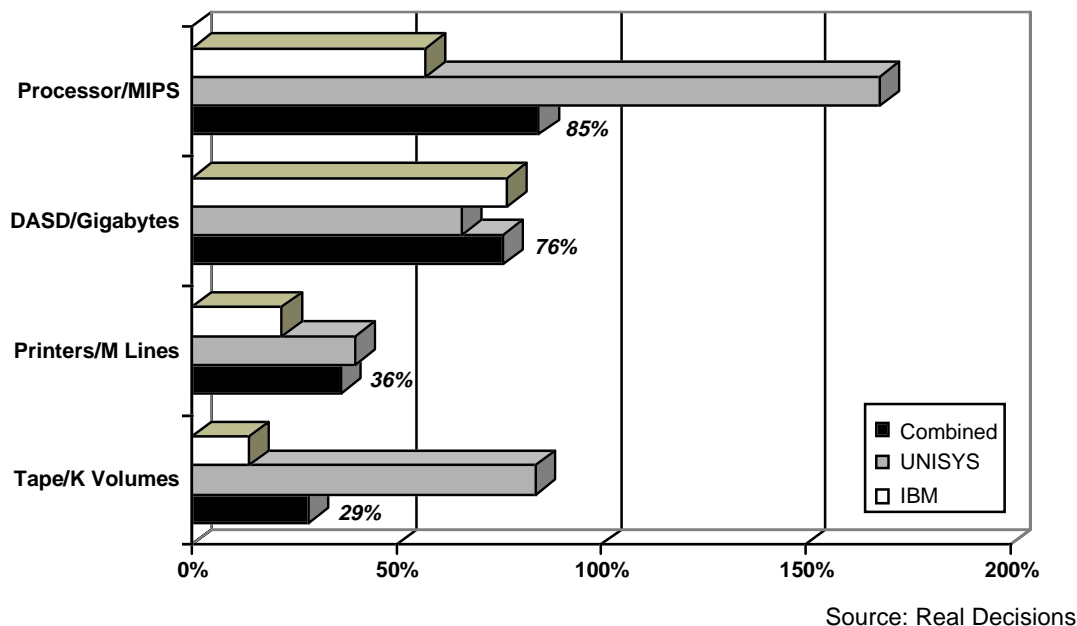
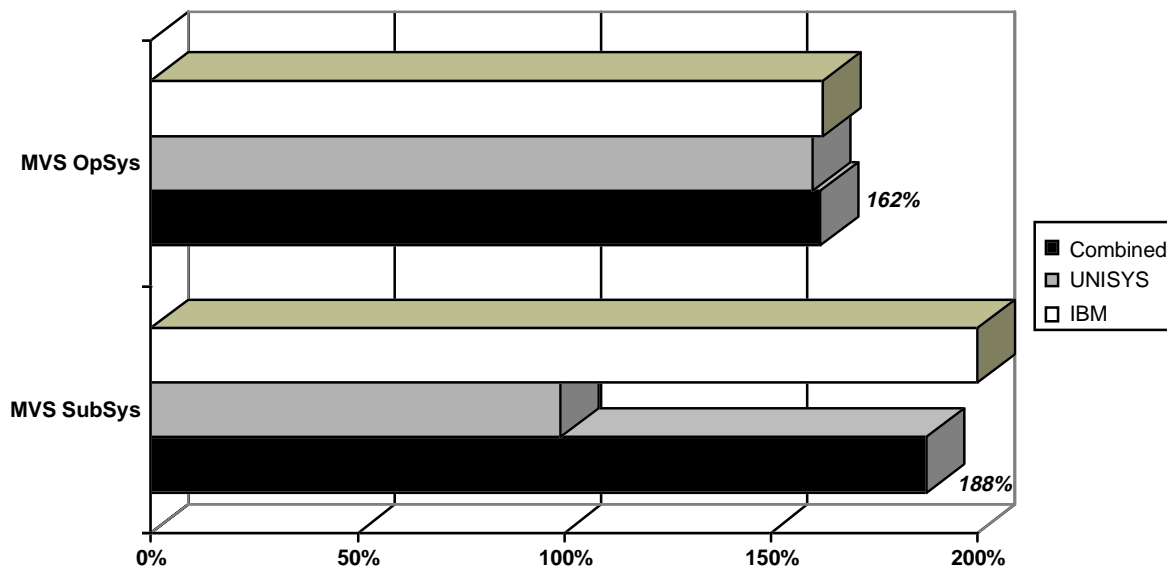


Figure 10. Hardware Costs Against Government Peer Group

In an earlier figure (Figure 9), Difference from Average by Category, demonstrated the low-cost hardware environment for the Commonwealth. Starting with this base, we would expect all the hardware cost categories to be quite low. This figure demonstrates this again. The only exception being the Unisys mainframe. This proprietary hardware is marketed in a non-competitive market yielding high costs. This fact is demonstrated in this figure.

#### 2.1.2.5. System Software Costs Against the Government Peer Group

As with other examinations of details, our motivation is to identify root causes. Our rationale for creating this next figure was to examine the system software issue in more detail. This figure examines the two system software components and the combined against the GVT peer group, represented by the 100 percent level.



Source: Real Decisions

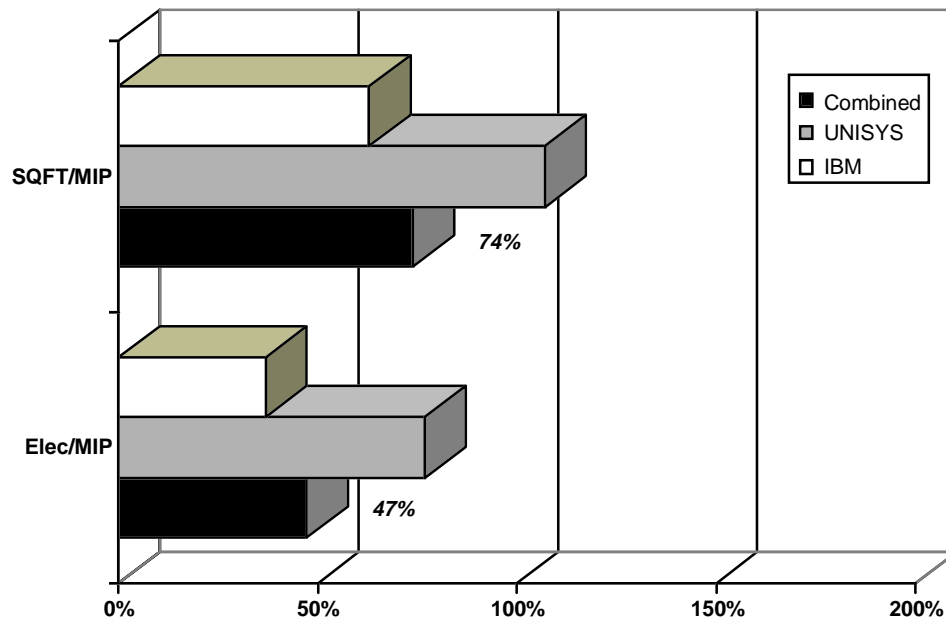
**Figure 11. Systems Software Costs Against Government Peer Group**

All systems software costs at DIT are high in comparison to the Governmental Group. The detail points to operating system software costs which are high (the term MVS applies to the MVS operating system in the IBM environment and the Unisys OS in the Unisys environment) for both environments. On the sub-system side, we see that the Unisys environment is more reasonable, while again the IBM environment is not.

Our analysis of this figure points again to the diverse environment that is maintained on the IBM platform in support of the many agencies. The Unisys environment represents a more heterogeneous environment, this being demonstrated by the lower sub-system costs.

#### **2.1.2.6. Occupancy Costs Against the Government Peer Group**

Figure 12 below, examines the occupancy costs of the two processors (and combined view) against the Government peer group. Occupancy costs include electricity, heating/cooling, square footage costs, etc.



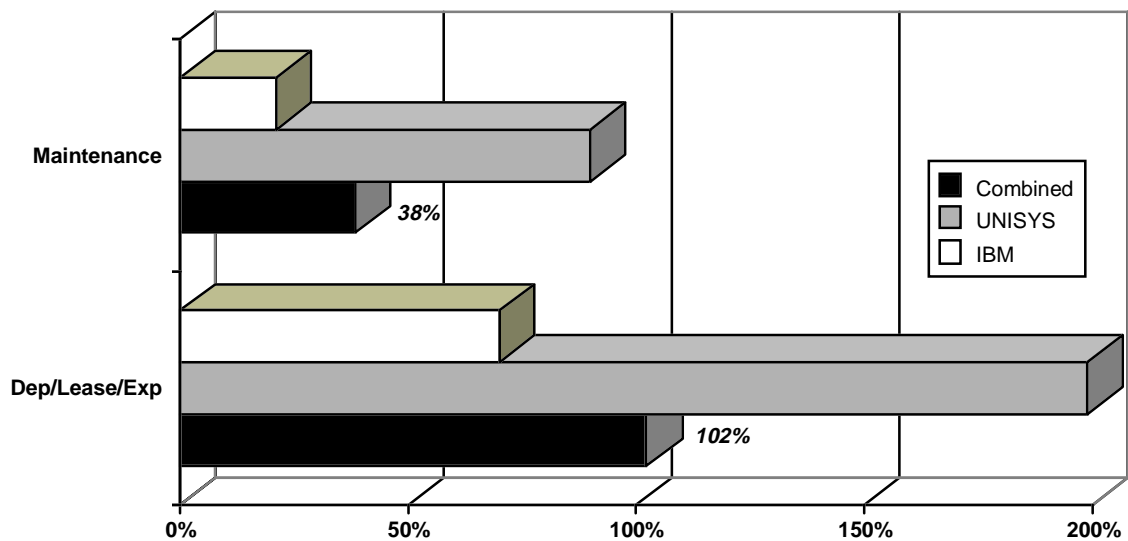
Source: Real Decisions

**Figure 12. Occupancy Costs Against Government Peer Group**

The conclusion to be drawn from this figure is the low cost the Commonwealth enjoys for occupancy. The older technology utilized in the Unisys environment manifests itself in a larger footprint and in higher power requirements, however, and is reflective above. But both technologies, across either measure, represent low cost and make the privatization question a definite no if the Commonwealth expects to realize lower costs at another physical location.

#### **2.1.2.7. Processor Costs Against Government Peer Group**

Figure 13 below, examines processor costs, specifically maintenance, depreciation and lease expenses against the Government peer group. An understanding of the processor costs are examined in more detail in order to attempt to identify root causes and to provide remedies to those issues where possible.



Source: Real Decisions

**Figure 13. Processor Costs Against Government Peer Group**

The hardware and lease expenses are excellent for the IBM mainframe environment. Again, the Unisys technology demonstrates itself through higher costs. We should note, however, that our database for Unisys platforms and mainframe environments is much smaller than that of the IBM environment; we view the statistical significance of the Unisys environment as less than the IBM.

#### **2.1.2.8. Headcount Costs Summary**

Table 5 outlines the headcount in both operations and technical services, and by sub-categories in each. Also, the average cost per professional is shown.

**Table 5. Headcount Costs Summary**

Operations	DIT	Tech Services	DIT
Management	3.9	Management	4.4
Shift Ops	57.2	Sys Prog	25.9
Help Desk	4.2	Security	4.1
Output Serv	12.9	Perf Meas	11.4
Prod Control	3.2		
Total	81.4	Total	45.8
Cost/Person	\$40,233.24		\$70,677.14

Source: Real Decisions

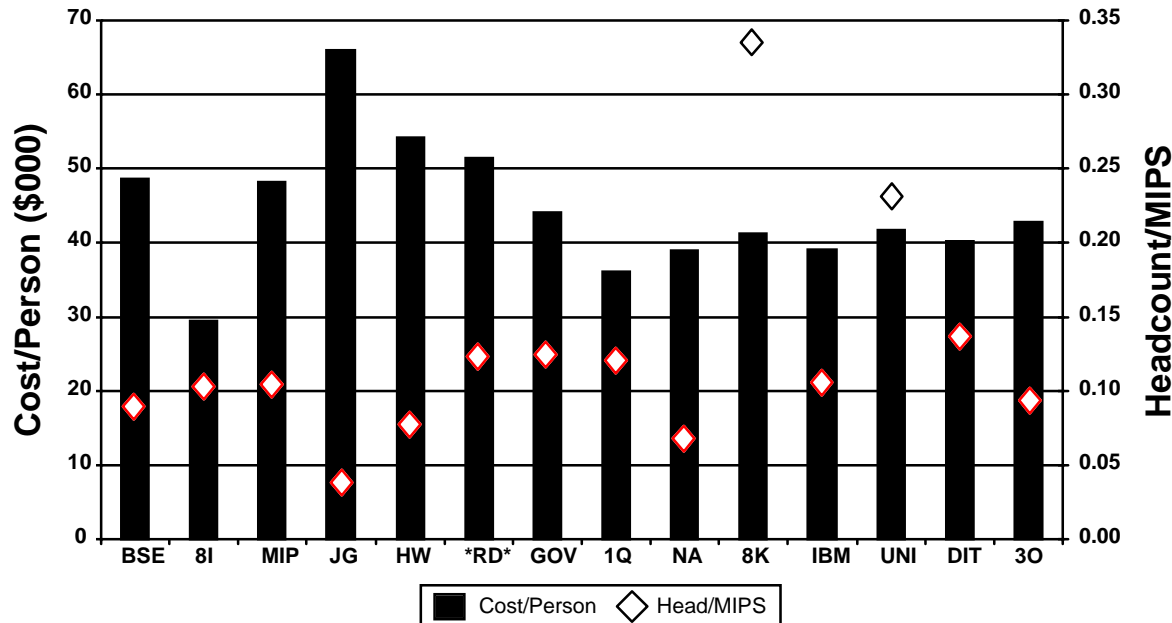


Our analysis leads us to conclude that although the overall compensation level of \$40,230 per person per year is below that of the peer groups, a higher level of total cost is representative of the Commonwealth and is driven by the additional headcount to support both the IBM and UNISYS technology. The average government installation supporting equivalent CPU capacity would have 74 operators. Other salient points are as follows:

- IBM operations staffing cost of \$1.8 million is 17 percent below the government peer group and the MIPS peer group average.
- IBM operations staffing of 47 is on par with the MIPS peer group and 15 percent below the government peer group.
- UNISYS operations staffing cost of \$1.4 million is 94 percent above the government peer group and 26 percent above the MIPS peer group average.
- UNISYS operations staffing of 35 is 58 percent above the MIPS peer group and 86 percent above the government peer group.

#### 2.1.2.9. Staffing Levels and Cost per Person

Figure 14 below, serves two purposes. First, using the left y-axis, the cost per person is displayed. Second, the right y-axis provides a view of the headcount per MIPS. Both are intended to provide an assessment of the staffing levels relative to the technology involved.



Source: Real Decisions

Figure 14. Staffing Levels and Costs per Person

Figure 14 above, illustrates the strength of the operations staff in the IBM environment;



the headcount per MIPS metric is on par with the Best Standard of Efficiency. Again, the Unisys environment is higher (much higher) than the peers and the IBM environment. The individual costs and the combined costs are low, and represent the geographic area (and hence lower compensation requirements) and the compensation policies of the Commonwealth.

### 2.1.2.10. Operations Headcount per MIPS

Figure 15 below, examines the details of the operations headcount area. Gartner Group examines the operations headcount per MIP as a percentage of the government peer group—across several sub-categories. Also presented is a staffing differential, in full time equivalents, from the government peer group. The cost per person metric (separated and at the bottom) is a percentage of the government peer group and the differential is in dollars (of total salary per year).

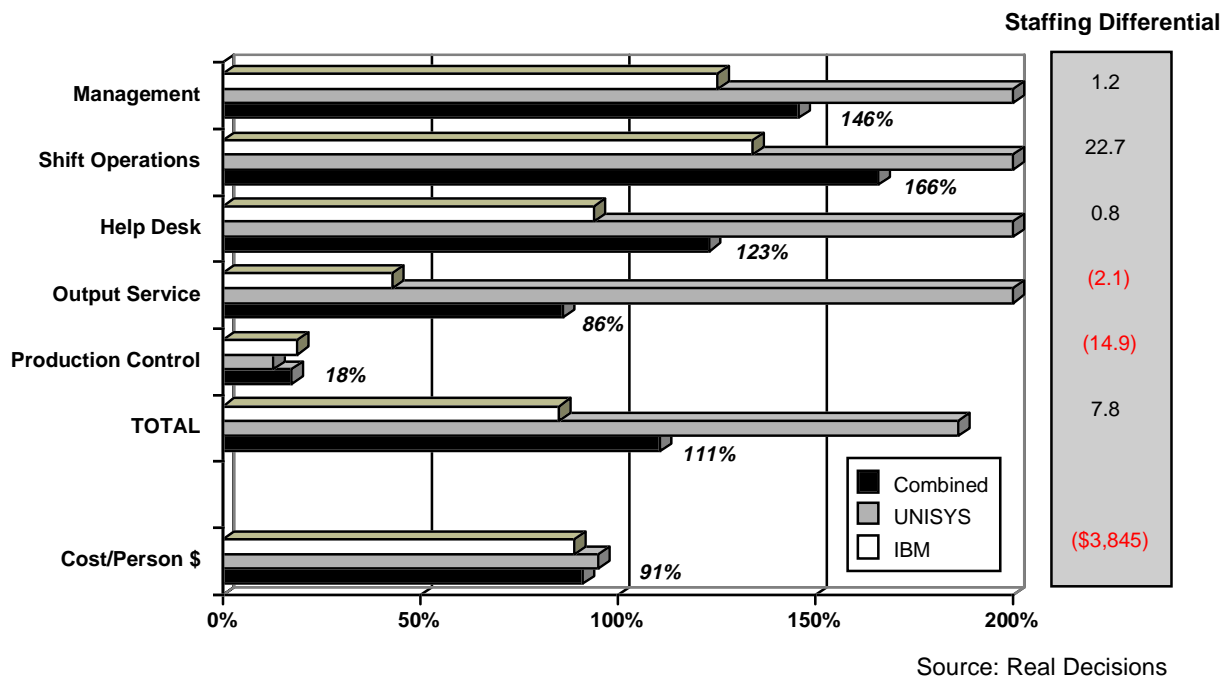


Figure 15. Operations Headcount per MIPS

In Figure 15 above, management and shift operations headcount is very high in comparison to our government peer group. This again is a factor related to the lack of economies of scale in dual platform environment. The output services and help desk categories are low on the IBM side but very high in the Unisys environment.

Production control, much of which is performed in the agencies and not tracked by this particular benchmark, is much lower for both environments.

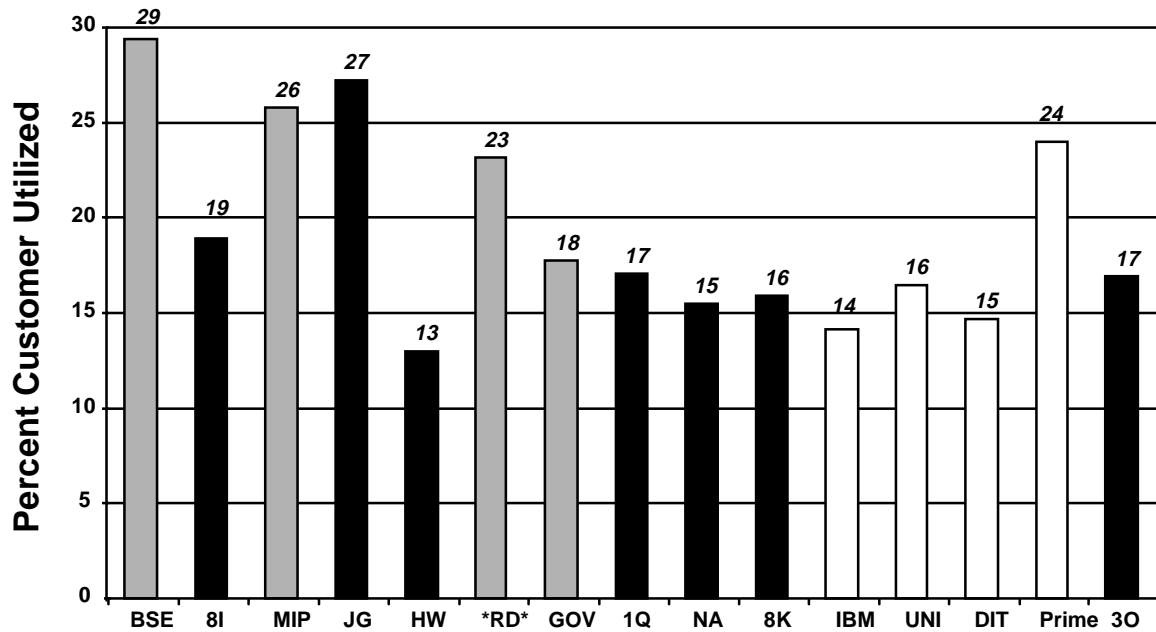
Overall, we see a degree of efficiency in the approach DIT takes toward managing the IBM operations environment, and some challenges associated with the Unisys environment. Given the efficiency DIT has with the IBM environment, Gartner Group believes that the Unisys problems are more attributable to the technology involved and



not the management processes.

### 2.1.2.11. Percent Customer MIPS

Figure 16 below, presents a view of the percent utilization (of total capacity) of the mainframe environment (IBM, Unisys, and combined) overall and in prime time. Prime time is defined as the normal business hours. This figure helps understand the degree to which the IT assets are used.



Source: Real Decisions

Figure 16. Percent Customer MIPS

Analysis of this figure yields several interesting points, the most important relating to overall utilization at DIT. This figure demonstrates a degree of under-utilization at the DIT data center on an aggregate basis. This straight utilization of 15 percent is being compared to the others on a 7 X 24 operational basis; the prime utilization is at 24 percent. Overall customer CPU utilization is 17 percent below the average government installation and much farther below the other peer groups (BSE and MIPs).

The other salient point is in regard to the batch vs. online aspects of the workload. The prime workload is much higher (utilization) suggesting the mainframe's capacity is driven by the online needs of the agencies. The batch cycle, in comparison, is very quiet relative to our peer groups. This is typical of other government organizations, and is an issue which DIT cannot directly affect. Also, providing enough capacity for the prime-time online needs is much more costly than the batch workload category. Additionally, the batch window can be manipulated as needed if a mainframe complex is heavily batch oriented.



One last interesting point: Gartner Group's calculations demonstrate that an increase in CPU utilization to the government peer group average of 18 percent improves the NOW Index from 1.10 to 0.95.

#### **2.1.2.12. Value of Work Produced**

Table 6 below presents a summary, in both raw metrics and in dollar value, of the workload produced by the entirety of DIT (the information presented is strictly factual).

**Table 6. Value of Work Produced**

<b>Workload Category</b>	<b>Annual Production (000's)</b>	<b>Unit Measure</b>	<b>Standard Unit Cost</b>	<b>Value of Work Produced (000's)</b>
Batch	17,043	MIPS Min	\$0.20	\$3,461
Interactive	2,938	MIPS Min	\$0.30	\$885
Online	26,143	MIPS Min	\$0.41	\$10,615
DASD	9,123	MB	\$0.35	\$3,151
Print	1,012	K Lines	\$0.33	\$331
Tape Mount	1,092	Mounts	\$0.58	\$628
Tape Vault	1,205	Volume	\$0.35	\$424
<b>Total</b>				<b>\$19,495</b>

Source: Real Decisions

#### **2.1.2.13. Value of Work Produced per MIP**

Figure 17 represents another comparison by category against the government peer group. This figure examines the value of the work produced by all aspects of the DIT data center, normalized to a per MIPS basis. This normalization allows Gartner Group to compare the higher MIP and lower MIP GVT peer group organizations with each other and with DIT. This figure provides a view of the workload produced on a relative basis. A figure of 46 percent (batch) indicates that the DIT data center is producing 46 percent of the average for the government peer group, on a per MIP basis. The overall aim of this figure is to get a sense of the workload mix, relative to capacity.



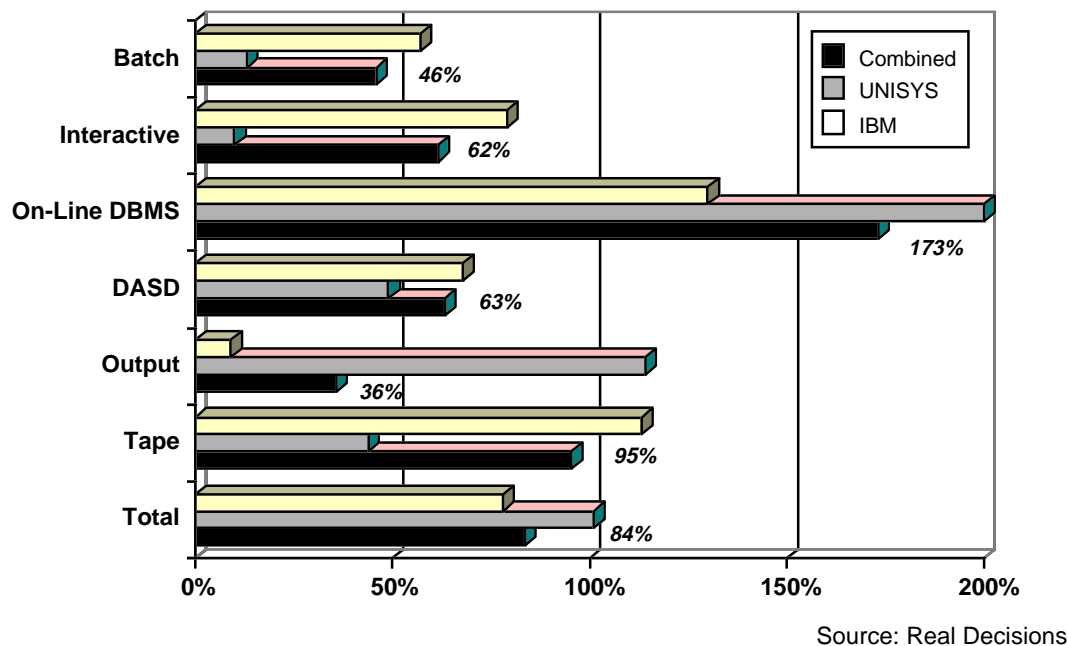
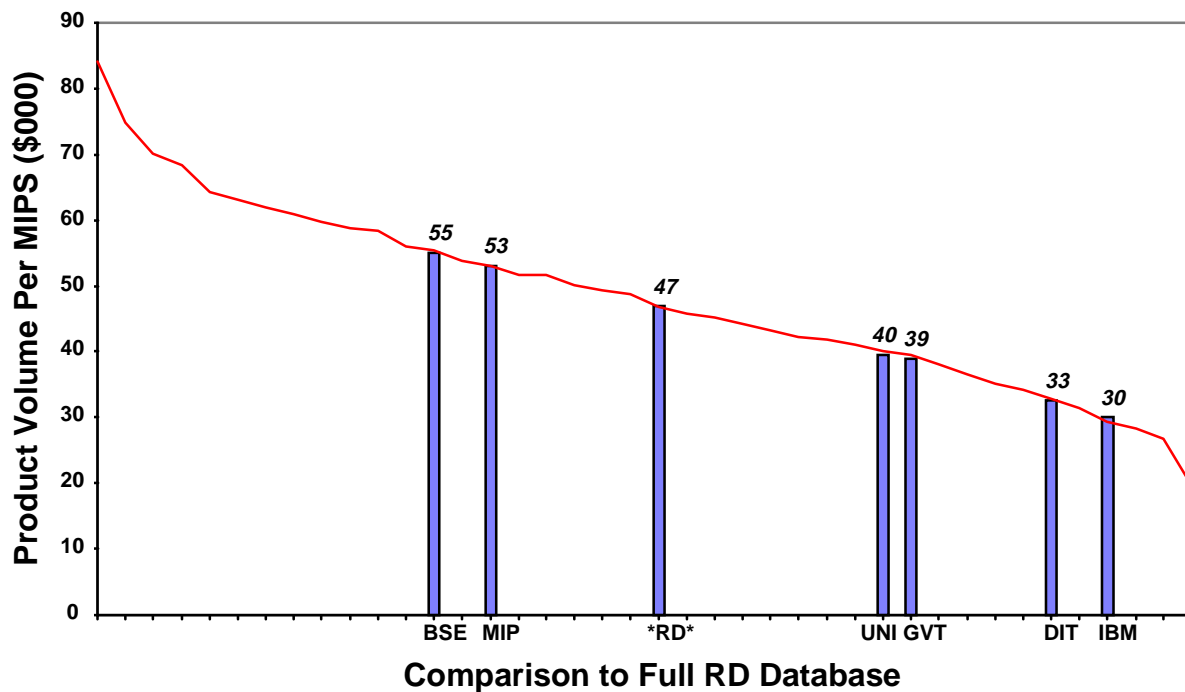


Figure 17. Value of Work Produced per MIPS

Our analysis of this figure demonstrates again the mix of workload skewed toward online (database management systems) DBMS traffic. The IBM utilization of more than 130 percent per MIP makes this environment one of the most utilized that Gartner Group has seen. Further, we expect that many of the hardware investment (and to a degree the software investment) decisions are driven by the requirements of the online DBMS environment. As stated previously, this investment is typically the most expensive.

#### 2.1.2.14. Value of Work Produced

Figure 18 below, presents the value of the work produced by the entirety of the DIT data center. The work produced is calculated based upon the quantities of “goods” produced by each group (or category in Gartner Group’s Real Decisions nomenclature). These quantities are then multiplied by standard dollar-per-unit values created through the Real Decisions benchmark process (these figures are essentially averages compiled from the entire database of organizations surveyed). Again, the values are normalized by MIP.



Source: Real Decisions

Figure 18. Value of Work Produced

The value of work produced at DIT is lower than our government peer group, except for the Unisys environment (this represents neither a strong or a weak point until compared against the costs to provide).

### 2.1.3. Privatization Interview Process

As described in the first section, Gartner Group conducted a series of interviews with two groupings of agencies, the core and secondary groups. The core group required one to two days of both one-on-one interviews and group interviews, while the secondary group typically required one-half day of focus group interviews with key professionals. One of our main subjects for discussion was the privatization issue. This section presents our results from those interviews.

Eight areas were explored in the privatization interviews. These interviews were intended to capture qualitative data regarding the privatization issue and the Commonwealth's professionals' views toward the privatization issues. The areas are defined as follows:

#### 2.1.3.1. Cost

This category looked at cost-effectiveness of DIT's services, and the interviewees' basis of these perceptions. We also asked about perceptions of the costs associated with an outsourcer.



### **2.1.3.2. Quality**

This focused on the quality of DIT's services: availability, responsiveness, timeliness, adherence to schedules and defect rate, also interviewees basis for this perception. It also includes perceptions of outsourcers ability to deliver quality services.

### **2.1.3.3. Resources**

This relates to the availability of people needed to obtain the IT services, and causes of any difficulties, as well as availability of IT resources needed by and at the agency level.

### **2.1.3.4. Knowledge**

Knowledge looks at whether DIT staff possess a knowledge-base of information that is critical to the ongoing business performance and success of the Commonwealth, and in what areas.

### **2.1.3.5. Careers**

This relates to options for career advancement or professional development for IT professionals in state government, either within DIT or moving into the business areas of the agencies. Also, it examines IT job security status in the Commonwealth.

### **2.1.3.6. Change**

Are there any business change initiatives; e.g., business process re-engineering, planned or in progress that may have a significant impact on the DIT organization? It also asks whether significant changes are needed in the way the Commonwealth's IT organization creates and delivers IT services.

### **2.1.3.7. Flexibility**

This looks at whether the agencies are seeking a more flexible IT service arrangement than that available from DIT.

### **2.1.3.8. Risks**

This item looks at short-term and long-term risks which face the Commonwealth in considering outsourcing.

### **2.1.3.9. Alternatives**

Alternatives asks about other possibilities besides outsourcing or privatization which might achieve the same goals as that of an outsourcing arrangement.

## **2.1.4. Privatization Interviews—Results**

Before proceeding with a discussion of our results, two points must be made. First, the information collected via this specific process is inherently subjective. The interviews with the many professionals, while structured, were conversational and many areas were covered. Hence, the information collected and represented below should be viewed with this mind. Second, with respect to the cost information collected, the opinions expressed



were relative. The benchmark results, presented above, represent the quantitative results necessary for our evaluation. While this section of the report deals specifically with the data center operation, the comments within this particular section address other aspects of the DIT operation.

#### **2.1.4.1. Cost**

- Almost all interviewees believed that the costs for data center services were reasonable. While the decline in costs are not enjoyed by the agencies, given that the Department of Budget and Planning (DBP) removes rate reductions from the budget, the cost savings were appreciated.
- Comments about the telecommunications services were much more mixed, and do not lead us to a discrete conclusion. Many interviewees believed that the charges for both voice and data were reasonable. Others thought that the data communications charges were high and that the overhead added for billing administration was excessive.
- The programmers/analysts-for-hire groups (SDD, TCD, and IED) were viewed as expensive by some of the agencies. A minority of the interviewees believed that less expensive programmer/analyst resources were available through external sources. Our analysis of the situation leads us to similar conclusions.
- Most of the professionals interviewed had long tenure with the Commonwealth and have not been exposed to costs charged by other IT providers and vendors.

#### **2.1.4.2. Quality**

- Overall, the quality reviews for the data center were good. The area of concern seemed to be associated with the introduction of new technologies. Many individuals expressed their concern about what they perceived as a lack of willingness to adopt new technology. These professionals believed that their particular agency would be helped by the acquisition of new technology (improved quality of service or productivity would be the result).
- The voice network generally received favorable reviews.
- The programmers for hire groups (SDD, etc.) generally received high-quality reviews, and in particular for the individual programmers' and analysts' knowledge of the Commonwealth environment.
- A small minority of the interviewees expressed concern over the lack of direction the Commonwealth seemed to be taking with respect to the data network. Even with the knowledge that the Commonwealth was committed to a long-term contract, this vocal minority believed that changes should be made in the WAN to improve service and decrease costs.



#### **2.1.4.3. Resources**

- Most interviewees expressed satisfaction at being able to obtain access to certain professionals and to the services needed.
- There is a perception that many of the employees at DIT are senior and hence represent a higher compensation level.

#### **2.1.4.4. Knowledge**

- Most interviewees expressed concern over losing the data center staff through an outsourcing effort. The knowledge of the overall Commonwealth environment and the batch job and operational environment that the operations staff has is the basis of this comment.
- A minority of the interviewees expressed concern over the technical knowledge level at DIT and believed the technical professionals were lacking technical knowledge, and in some cases technical competence.

#### **2.1.4.5. Careers**

- The DIT staff, given their long tenure, tend to be loyal to the Commonwealth; an outsourcing concern probably would not be.
- A technical professional has the option to pursue opportunities at any of the agencies with IT capability; all open positions are posted.

#### **2.1.4.6. Change**

- The Workforce Transition Act reduced staff at all agencies within the Commonwealth, including DIT. Most interviewees believed that the effects of these changes were still being felt.
- Much processing is migrating away from the data center (the Unisys environment in particular) to the agencies; this trend was reported by all interviewees.

#### **2.1.4.7. Flexibility**

- All interviewees are seeking a more creative set of solutions to their needs from DIT. The growth in IT capability at the agency level is a result of the agencies fulfilling their own needs through their own IT. Many agencies would prefer to not manage an IT operation.
- The overall structure at DIT appears to be quite rigid, according to many of the interviewees.

#### **2.1.4.8. Risks**

- Transition and personnel management were cited most frequently as risks in the short-term.



- Cost is the primary long-term issue of concern. Many interviewees cited a failed outsourcing arrangement in the Richmond area as an example of an outsourcing arrangement that was not well conceived and hence could be a risk for the Commonwealth.

#### **2.1.4.9. Alternatives**

- Many interviewees thought that outsourcing was already a part of DIT's strategy. The network is outsourced to a great degree, the "body-shop" contract permits use of external expertise, and certain maintenance functions are outsourced.
- Also, many agencies feel that they are already outsourcing their IT needs to an outsourcer—DIT.

#### **2.1.5. Data Center Privatization Conclusions**

We have presented both qualitative and quantitative information regarding the DIT data center operation. Our benchmark process was extensive, detailed and accurate while the interview process covered all key agencies and key professionals at these agencies. The decision whether to privatize was not taken lightly, and much analysis supports the recommendations made.

***Recommendation (G1). The Virginia General Assembly should not privatize the data center operated by the Department of Information Technology at this time.***

***Recommendation (G2). The Virginia General Assembly may wish to require biennial benchmarks of the State data center. In addition, the General Assembly may wish to direct the Joint Legislative Audit and Review Commission to reassess, once every five years, the appropriateness of outsourcing the services provided by the State data center.***

#### **2.1.6. When and How to Privatize**

##### **2.1.6.1. Introduction**

This section of the document provides a general discussion of the outsourcing and the outsourcing decision process. This provides a point of reference for future outsourcing discussions. We start this discussion with the remembrance that it has been half a decade or so since Eastman Kodak Company stunned the IT world and announced that it would outsource many of its IT functions. That, in effect, was the beginning of the outsourcing interest that has swept the industry and which shows no signs of abating.

Outsourcing is here to stay—at least for the 1990s. As corporations, governments, universities and the like search for ways to compete globally, provide more efficient public services, pare payrolls and cut costs, outsourcing of non-essential functions rises. In what had been a sub-par economic recovery during the early to mid 1990s, organizations viewed contracting with specialized firms at a supposed "fixed price" as a panacea for their economic woes. Outsourcing support functions enables organizations to concentrate



on their core competencies, such as administering a welfare program or taxing constituents. Although senior managers may believe IT is critical to their organizations, they do not necessarily believe that owning their own IT staff is critical.

However, not every organization that decides to outsource has, or will, find that the arrangement is successful or meets all its objectives. While much still needs to be learned about maximizing an organization's chance for success in various outsourcing relationships, "best practices" and critical success factors are beginning to emerge.

When the Commonwealth examines outsourcing in the future, it can learn from the successes and failures of other organizations that have already entered into an outsourcing agreement. In almost every case, the most dissatisfied practitioners either neglected to follow a disciplined process, did not obtain qualified assistance, did not document many important items in the contract, or did not give adequate time and thought to how they would manage the deal once the transition was completed. The Commonwealth should recognize that the "homework" and then some must be done in order to achieve a successful long-term outsourcing arrangement.

In general, is outsourcing the right thing to do? Clearly this is the critical question behind this study. There is plenty of anecdotal evidence which suggests that while cost savings may be somewhat elusive in many cases or less than expected, other benefits have definitely occurred. Further, we believe in general that many of the problems that users are currently experiencing could easily have been avoided through better management and/or the appropriate contractual provisions. Users familiar with the state-of-the-art methods in outsourcing contracts will maximize their potential for outsourcing success, obtain better pricing, be able to address executive concerns and have greater success in renegotiating their deals as issues change.

#### **2.1.6.2. *Outsourcing Lessons***

What has been learned about outsourcing? Are these deals successful or are they failures?

- Many organizations have reported benefits from their outsourcing deals, although cost savings have, in general, been less than expected.
- Many outsourcing deals will experience difficulties during the next few years; and some organizations will switch outsourcing vendors, but will not return to an in-house solution.
- The organizations most dissatisfied with their deals had signed contracts that dramatically favored the vendor.

#### **2.1.6.3. *Outsourcing Pitfalls***

What are the potential pitfalls, critical success factors and "best practices" in outsourcing (source: Shaw, Pittman, Potts & Trowbridge)?

- Companies undertaking outsourcing projects must set objectives, follow a disciplined process and leave enough time to evaluate properly and to establish a



relationship with the outsourcing vendor.

- Complex outsourcing transactions should be analyzed in three phases—establishing, managing and terminating the outsourcing relationship. Difficult issues and risks are associated with each stage. The issues are interrelated and should be addressed before the outsourcing relationship is formalized in a contract.
- Organizations must become more sensitive to employee anxiety regarding potential deals and be aware of possible legal problems arising from personnel issues related to the outsourcing transaction.
- As organizations selectively choose the best of breed for individual IT activities, they must learn how to mix, match, measure and manage external service providers successfully.

#### **2.1.6.4. Outsourcing Vendors**

Who will be the successful outsourcing vendors of the future?

- New entrants to the outsourcing arena will continue to appear as users, networking vendors, systems vendors and various niche players all try to gain business; most will have limited success.
- As profit margins on data-center deals continue to erode, vendors will be forced to choose whether to sell commodity services or to concentrate on value-added services; users will also have to make similar purchasing choices.
- Some of the strongest second-tier vendors selling commodity services—such as The Genix Group, Power Computing and Litton Computer Services—will take business away from some of the larger vendors.
- Large international players—such as Computer Sciences Corporation (CSC), Electronic Data Systems Corporation (EDS), and IBM—will gain market share internationally and will begin to dominate the industry worldwide.

#### **2.1.6.5. Outsourcing Process Best Practices**

We begin our discussion of best practices by examining the top five reasons outsourcing arrangements fail:

1. Inadequate time for the evaluation
2. Imprecise scope
3. Choosing the wrong vendor
4. Ignoring management issues
5. Insufficient protection in the contract.

The following list of items represents the most common challenges associated with establish an outsourcing agreement and arrangement:

- The customer cannot formulate objectives or articulate them to the vendor.
- The user process becomes highly politicized, making it difficult to achieve an





objective assessment of available options.

- The RFP does not contain a sufficient level of precision; resulting proposals from individual vendors are not comparable.
- The vendors propose a pricing structure that is too rigid to accommodate changes in business requirements or technology.
- The prospect of outsourcing causes great staff anxiety. Performance and morale may degrade until the decision is made.
- The customer fails to consider the need for third-party approvals until late in the process, which may delay consummation of the deal or add to the price.
- The customer chooses the vendor too early and loses negotiating leverage.
- Due diligence is performed after the winning vendor has been selected.
- The customer postpones resolution of issues until after the contract is signed.

The following represent a set of best practices in response to the issues listed above:

Identify key objectives and stay focused on them throughout the evaluation and negotiation process. Carefully considered and clearly communicated objectives are vital to the establishment of a beneficial relationship. This is even more important when a customer's IT operations are spread among divisions that operate with some degree of autonomy. The objectives can also be used to help formulate specific evaluation criteria and to assess potential trade-offs being discussed during negotiations. If the customer fails to state its objectives clearly, this will waste time and resources in evaluating bids that were not designed to meet the customer's needs. Time is lost as the vendors have to subsequently adjust their bids. Lost time can skew the negotiation process in favor of the vendor; it can also create morale problems within the customer organization.

Write a comprehensive RFP focused on business issues. The competitive nature of the bidding process can keep vendors from taking unreasonable positions. The RFP (or term sheet) should contain a sufficient level of precision. If not, resulting proposals from individual vendors will not be comparable or will be too vague to be useful. This may also result in the customer making inaccurate conclusions about the various prices proposed by each vendor. The RFP should not be limited to the technical side of the deal. It should summarize the key business terms and objectives. Only key contractual provisions that the customer considers mandatory should be included at this point (e.g., software terms). Most contractual provisions (e.g., liabilities and warranties) should be deferred to contract negotiations.

While difficult in the Commonwealth's procurement systems, be selective when inviting vendors to bid. Many users either send out RFPs to a large number of vendors (10 to 20) or issue a request for information (RFI), followed later by an RFP. Usually, neither approach is warranted. Customers can usually pre-screen vendors to eliminate unsuitable candidates before sending out the RFP. Inviting too many vendors to bid increases the length of time to perform the evaluation and wastes vendors' time and resources. The cost of the evaluation process is eventually billed back to the customer.



Remember, nobody gets a free ride. An RFI may be useful to assist companies in assessing which suppliers should later receive the RFP. However, this approach usually causes the customer to spend more time and resources on the evaluation process than is necessary.

Be clear and comprehensive about the scope of services. A clear and comprehensive definition of the scope of services to be covered is absolutely critical. During the evaluation process, it is the only way the customer can compare proposals on an “apples to apples” basis. During the life of the contract, it is the only definitive statement of what the vendor is contracted to do. There is often significant misunderstanding between vendor and customer on this issue (particularly as participants change), and it usually works in favor of the vendor; users have little recourse under these circumstances. (Users are also well-advised to document agreements made throughout the negotiation—this may come in handy at a later point in the deal).

Permit and encourage due diligence. Due diligence allows vendors to develop a more thorough understanding of the IT organization, practices and user community so that they can devise a workable contract and can verify the scope of the deal and their pricing assumptions. It usually occurs after the letter of intent is signed (if this occurs) or after the client has decided upon two finalists and commences final negotiations with the two simultaneously. Activities include: verifying data and costs, assessing staff, finalizing the transition schedule, developing and signing a services agreement, assessing service level agreements (SLAs) and assessing management processes. The data gathered during this period can also be useful in that it can expedite execution of activities that occur during the transition.

Do not end the vendor competition too early. Keep the process competitive for as long as possible. When users choose a vendor too early (before they have clearly negotiated all terms of the relationship with the preferred provider), they invariably lose negotiating leverage. The same thing occurs if the user considers only one vendor. No matter how much a user likes a vendor, the user must remember that negotiation will lower the price.

Do not count on bids until due diligence is complete. The purpose of due diligence is to allow vendors the opportunity to obtain any additional information that they need to finalize their bid. Prices often rise after this process; therefore, users should have the two finalists complete due diligence and confirm their bids before they chose the winner and sign the contract. Users should not let the vendor reopen negotiations on price or other significant issues after the other competitors have been eliminated. Otherwise, vendors can claim that information they have just uncovered increases the price, leaving the customer with a signed contract and no alternatives.

Consider business and major contractual issues early, but do not get bogged down in the terms and conditions. Although prospective clients try to follow this rule, they frequently insert minor terms and conditions (Ts and Cs) in the RFP and end up spending time up front discussing these rather than framing the larger business elements of the deal. Users should let the lawyers argue about commonly used Ts and Cs at contract negotiation



time and not waste valuable time up front, before they have selected a vendor.

Think about third-party consents. Licenses and contracts should be reviewed early on in the evaluation period to determine which consents are required to transfer software or hardware and who will pay the transfer fees, which are often quite large. If the independent software vendor (ISV) or hardware lessor is uncooperative, the migration to the vendor may be delayed and/or lawsuits may be filed later on. For example, in the past, Computer Associates (CA) would not allow users to transfer its system software to Electronic Data Systems (EDS) and others without paying exorbitant fees. More than one user was forced to cancel a deal at the last moment due to CA's intransigence. Until recently, when EDS and CA resolved their differences, many of the deals involving the two of them (e.g., U.K. Inland Revenue and National Car Rental) encountered such problems.

Plan software transfers. Users do not usually have the power to transfer their software licenses to the outsourcer, so some special arrangements must be made. Sometimes, users obtain the right to temporarily transfer the license to the outsourcer, allowing the vendor to use the software exclusively for that user. If the user keeps the right to use the software, even if he or she does not pay maintenance, he or she can renew the license if the outsourcing deal is terminated, by paying the back maintenance fees. Usually this will cost less than rebuying the license.

Anticipate personnel issues before and after the deal is completed. Companies must become more sensitive to employee anxiety regarding potential deals and be aware of possible legal problems arising from personnel issues related to the transaction. Morale and productivity can suffer greatly while employees wait to hear about their future employment. (For that reason, we recommend that users do not prolong the evaluation stage unnecessarily).

Avoid inflexible price structures. Basic pricing structures are agreed upon during Phase 1 and should be able to accommodate change. However, it is difficult for a user to assess whether these charges will continue to be attractive for the entire length of the contract. Past contracts, particularly data center and applications contracts, were usually based on fixed fees or fixed rates. The customer would pay stipulated rates for defined service categories that assumed a certain volume within each category. Experience with fixed-rate deals signed only a few years ago based on expected trends in processing costs have shown that vendors generally have fared better than users. For example, we have seen many contracts recently where the cost for a CPU minute is \$11, much higher than prices quoted today.

One alternative to fixed rates that is gaining popularity is value-based pricing. In value-based pricing, some portion of the price a customer pays is tied to the impact of the vendor's performance on the customer's business. The major difficulty with this approach is finding a measure of business value that fairly reflects the impact of the vendor's performance on the customer's business. Where this scheme is possible, the vendor has more incentive to improve the customer's business rather than simply increase its



revenue or profit margins. Other pricing structures include pricing separately by service, shorter contract terms and market-related caps or adjustments (e.g., the pricing should be in line with the relevant industry cost/price index).

Reserve the right to hire third parties for new services. Vendors will usually try to obtain exclusive rights or first rights to provide new services (e.g., design and implement new systems or perform Business Recovery Plan (BRP) activities involving new technologies). The contract should stipulate whether the vendor has the exclusive or preferred right to provide new services and the associated pricing mechanisms to use. Conversely, the customer may wish to reserve the right to hire third parties for any new services that are needed. If third parties can be hired, the contract should specify that the first vendor must cooperate with them and how.

Determine methodologies for price adjustments. Pricing algorithms should result in predictable charges for in-scope services, while allowing both sides flexibility to make adjustments on a fair basis to accommodate changing circumstances. Therefore, the contract should describe circumstances in which adjustments can be made (e.g., change in unit technology costs, cost of living adjustments (COLAs), fluctuations in applications maintenance requirements, or changes from the acquisition or disposal of business units). The contract should also describe, if possible, how these adjustments will be made, e.g., COLAs may vary by components such as labor rates and equipment prices.

Stipulate Service Level Agreements (SLAs) in quantitative and qualitative terms. SLAs are one of the key ways that users can manage vendors, as well as improve existing service. Users should attempt to describe their existing SLAs (quantitatively and qualitatively) as completely as possible, and request that, at a minimum, the vendor meet these. The contract should specify 100-percent service accountability (e.g., do not specify SLAs for 90 percent of transactions and ignore the remaining 10 percent). The contract should also specify liquidated damages if the vendor fails to meet an SLA. Consequences for vendors repeatedly missing these SLAs (e.g., consecutive increases in penalties eventually followed by termination) should also be included.

Often, SLAs are updated annually to reflect improvements in procedures or technology. Liquidated damages (an agreed-upon monetary remedy) are penalties imposed for not meeting SLAs. They are generally calibrated to the severity of the failure and are primarily there to remind the vendor of its obligations. They often take the form of a credit against the next month's base fee, e.g., the user will receive five percent of the vendor's expected monthly fee for the first violation, 10 percent for the second, etc. The penalties do not have to bear a relation to any actual loss.

Negotiate reasonable liability caps. Vendors generally attempt to disclaim all forms of liability. While the courts will allow some limitations of liability, they do not usually allow disclaimers of all liability. Penalties are subject to negotiation, but, today, liability is usually limited to direct damages, not indirect, special or consequential damages. For direct damages, a cap related to several months of fees is typically negotiated. When fixing limits on liability, the parties should stipulate whether or not penalties for failure to



achieve SLAs are affected by the cap.

Establish management controls. Most clients have the vendor write and then implement a separate management procedures manual. However, the contract may need to specify: the extent to which the customer has control over personnel assigned to the deal; the extent a customer has control over functionality; and the method of performing the services.

Define the ownership issues related to software developed by the vendor. The question of ownership will always arise in deals involving software development and/or maintenance. Users (or their designees) must be able to use any software owned by the vendor after the contract ends to perform their IT functions. The contract should stipulate who owns the software and/or enhancements and what rights, if any, the non-owning party has to use, market or alter it. The contract should also stipulate what restrictions, if any, should be imposed on the vendor regarding software locks or other code which could limit/disallow access.

#### **2.1.6.6. Failure Avoidance Strategy**

The discussion immediately above outlines many strategies which can be employed to minimize the risks associated with the outsourcing process. The following three specific steps deal with assessing and addressing the specific risk of failure.

1. **Evaluate the Impact of a Failure.** In evaluating risk, most government organizations examine the potential impact on their program or operation caused by the failure of a system. DIT should already be aware of the potential impacts. This analysis is typically performed by checking with agencies to ensure that awareness of systems' criticality is correct and up-to-date. The agencies can then draw up a list of all the operational systems in order of criticality and use this list to determine the risks of outsourcing a particular IT function.
2. **Evaluate the Likelihood of a Failure.** A system can be mission-critical, yet low risk, because it hardly ever fails. The factors that bear on the likelihood of failure include:
  - Volatility: Many applications are stable because they have been in service for some time, are mature and are changed only infrequently. Research shows that users can outsource such systems, no matter how critical they may be, because the likelihood of failure remains low. Best practices for outsourcing in this context include making sure the system's documentation is up-to-date and ensuring that the outsourcer performs a skills transfer to support the application. Conversely, systems that are changing rapidly offer high levels of instability and risk. A change freeze may be necessary during the transition period to the outsourcer to avoid system failure.
  - Maturity of Technology: Mainframe systems are so reliable that overall downtime is measured in minutes per annum. Outsourcing these mature technologies is low risk. Servers are less reliable, because they are often located in less secure environments, upgraded more often and handled by end users rather than IT professionals. This is especially true at some of the



- smaller Commonwealth agencies. Experienced users who are planning to outsource newer technologies focus on the vendor's technical skills to a much greater extent. They thoroughly check the vendor's experience with similar technologies, and they ensure that the vendor builds resilience into the technical architecture as part of due diligence.
- Customization: All systems are customized to varying degrees. Government organizations with code that has been largely written in-house have higher levels of risk than users with systems based on packaged software, or on enterprise application packages. Best practices for outsourcing heavily customized systems include permitting additional due diligence for the outsourcer to understand the systems in detail, transferring the skilled staff that support the systems to the outsourcer and ensuring that user and outsourcer use the same methods for change management.
3. **Evaluate Recoverability.** Savvy users know that all systems can fail, and the key to giving good service is the ability to recover quickly. Users need to understand if their staff employs local knowledge to recover systems. If this knowledge is embedded in the BRP, then an outsourcer can easily pick up the service. If the knowledge only exists in the minds of the in-house IT personnel, then users can choose to either transfer the personnel to the outsourcer or immediately upgrade the BRP. A BRP is a plan owned by DIT that provides for a complete restoration of all support services for the business following a catastrophic incident (e.g., a fire). Support services may include accommodation, transportation, catering, security, IT and administration.

#### **2.1.6.7. Technology-Related Outsourcing Challenges**

The following list of items represents the most common challenges associated with technology in the outsourcing context:

- The customer organization may wish to experiment with or use new/emerging technologies, but the vendor lacks expertise in these technologies.
- The customer organization may decide it needs additional out-of-scope technology and services, but finds that it is captive to a vendor that is unable or unwilling to provide the best deal on these new services.
- The vendor might refuse, or be too slow, to introduce new technology that the customer organization feels it needs to remain competitive.
- The vendor may introduce new technology that is inconsistent with the user's long-term needs.
- The customer organization may switch to a new operating environment, and the current performance standards, incentives and penalties no longer make sense.

The following represent a set of best practices in response to the issues and pitfalls listed above:

Develop an IT plan. In some cases, before deciding on a vendor, our clients have asked prospective vendors to create a technology plan. This allows the user organization to see



which vendors best understand its IT requirements and which vendors are best able to supply expertise on new technologies that might be desired later.

Conduct a migration to new technologies or IT architectures in stages. Users and vendors should define projects in small stages and provide the rights to terminate for convenience at each stage. For example, if users can find a vendor more experienced in specific new technologies, they will be able to switch without paying unreasonable penalties.

Follow a best-of-breed strategy, i.e., using the best vendor for each category of service. A multisourcing strategy enables users to delay choosing all vendors until their future plans are finalized. This approach may be particularly effective for the development of future systems, since new methodologies and technologies evolve rapidly. The approach also enables users to tailor the terms of each contract on issues such as pricing and measurements, thus preserving flexibility.

Avoid a preferred-vendor approach. Vendors may demand to be the “preferred vendor” or have the right of first refusal, but users do not have to comply, particularly if the vendor cannot effectively implement a particular technology. The vendor should also be required to cooperate with other (often competing) vendors that do have the required expertise.

Obtain veto rights over new technologies. Vendors feel they have the right to choose new technologies since these technologies may often help reduce total costs, while the user may wish to obtain control over these decisions. Vendors can be required to jointly review their new technology plans with the customer. However, users will probably have to pay something for this privilege.

Specify services on function, not on technology. Users should specify services on the basis of functions to be performed, not on the technology used to perform the function. Otherwise, the vendor may try to move in-scope services outside the scope of the contract if the technology used changes. This allows the vendor to charge again (and perhaps more) for these new, out-of-scope services without giving the user an accompanying reduction in price for no longer using the in-scope services. The most common examples today involve services once performed in a host environment that are now performed in a client/server environment with new technology. Another example would be specifying specific DASD devices (e.g., 3380) and later buying mass storage.

Provide for a material change in technology. If the price of technology dramatically declines, most users will want to share in the windfall even if they signed a fixed price deal (e.g., most users do not want to pay the fixed price if the vendor’s costs go down by 90 percent). At a minimum, users should specify that the vendor discuss new pricing if this occurs.

***Recommendation (G3). Gartner Group recommends that the various technology units of State agencies consider the outsourcing lessons, best practice, failure avoidance and technology-related outsourcing challenges outlined above.***



## **2.2. TELECOMMUNICATIONS SERVICES ARE CURRENTLY PRIVATIZED**

We begin our discussion by defining the network outsourcer. We consider a vendor to be engaged in delivering network outsourcing services when the vendor agrees to move the customer's assets or other financial obligations for network equipment and services (and/or the customer's people) from the books of the customer to the books of the vendor.

Next, an outsourcing vendor must have a separate outsourcing business unit, populated by a separate management team and staff that is specifically devoted to the delivery of outsourcing services. The separate business must have its own profit and loss accountability, thus allowing clients to identify whether the outsourcing unit can stand on its own or whether it is cross-subsidized by other entities within a vendor. Finally, the vendor must provide ongoing operations resulting in recurring revenue derived from a specific outsourcing contract.

We measure a network outsourcing vendor's offerings in the following categories:

1. Network service range (WAN, LAN or both).
2. Network service segments (voice, data or video).
3. Network service classes (physical networking, logical networking or both).
4. The vendor's geographic reach in delivering network services.
5. Ability to provide phone, LAN and PC support to the desktop.
6. Ability to perform the following network functions: planning, designing, implementing, operating and administrative tasks in pursuit of network account, configuration, fault, performance and security activities.

### **2.2.1. The Commonwealth Today**

The network is already outsourced to a great degree. On the data network side, all wide area data transmission services are outsourced. Bell Atlantic provides most of the intraLATA capability and MCI provides the interLATA capability. The technology employed is known as frame relay, and this technology permits the connection of any specific geographic site into the Frame Relay Network throughout the Commonwealth.

This network is analogous to a "cloud," and provides any-site to any-site connectivity; connections from each and every geographic site are fed into the cloud, which in turn guarantees delivery and transmission speed. It would not be economically feasible for an organization such as the Commonwealth to provide the long-haul (or short-haul) connections, whether through its own right-of-ways or through radio technology. This aspect of the network, again, is outsourced.

DIT does provide support for the DIT communications center and its associated hardware and software at that location (routers, etc). Further, DIT is responsible for the WAN side of every router that is connected to the Frame Relay network. Here then the network is not outsourced. At the agency end, the agency is responsible for the agency-side of the





router and every component of the LAN. In fact, no aspects of the LAN environment at the Commonwealth is privatized.

The voice network is also outsourced. The topology employed is known as a virtual private network, and permits many locations throughout the Commonwealth to be interconnected through the network. The primary technology employed is Centrex, where Bell Atlantic utilizes its own equipment to provide telephone services and calling features. Private branch exchanges (PBX) are used in a few locations. The only aspect of the voice network which is the responsibility of the Commonwealth are the moves, adds and changes (MACs).

Virginia Tech, in conjunction with several universities and community colleges, has developed an ATM network. While this network is built on ATM technology, and is now known as the "ATM Network", its technology, in the scope of this document, is not relevant. This network provides high-speed, any to any connectivity, and as such is comparable to the Commonwealth Telecommunication Network. This network is "outsourced" to Bell Atlantic (local connections) and Sprint (longer distance connections). The ATM network is discussed in more detail later in this document.

***Recommendation (G4). The Commonwealth of Virginia should continue to outsource all voice and data telecommunications network services.***

### **2.2.2. Network Outsourcing Process**

We understand that DIT has issued an RFP to suitable consulting firms to provide assistance in procuring a new set of contracts with network outsourcers and to develop an RFP in support of this. The existing contracts expire in 1998. We provide an outline of the network outsource process as template for this new procurement cycle.

Perform an Internal Service Evaluation. Before deciding to outsource network functions to an external services provider (ESP), IT organizations should evaluate what services and service levels their end users require and what is provided internally. Users should participate via surveys. For service levels needed, but not provided, examine in-house capabilities and develop a base case financial model for acquiring the necessary resources. Then, these figures should be compared to typical outsourcer capabilities and costs. Most network services providers will perform an initial analysis of a company's IT infrastructure and submit a bid free of charge as part of the proposal process. If, on the other hand, the IT department is already providing the service, it should assess whether the service is the best use of IT resources. Factors in this decision include determining if the service is of strategic value to the enterprise, if it is one of IT core competencies or if the organization is struggling to meet end-user requirements. Ideally, IT departments will coordinate all service levels but provide only those services within the department's core competencies and contract with external vendors to provide the remainder.



Establish Baseline Performance Levels. SLAs should be used regardless of whether the IT department or an external provider supplies the services. The purpose is two-fold. First, SLAs provide a quantitative means of comparison between external vendors and IT departments. Second, SLAs set expectations on what end users can expect from each service. Representatives from business units should be part of the negotiation process that determines baseline performance. It is likely that different departments will require different service levels.

Before ESPs sign up to provide a specific service level, they should define the purpose of the service; the number, classification, and location of users to be supported; and the types of devices to be managed. IT organizations should (though many are unable to) track accurate asset inventories, corporate standards, maintenance and support arrangements, and service-level baselines. If organizations have a grasp of this information, they will be better prepared to procure the appropriate services and thus minimize costs. ESPs must be cognizant of these parameters, because they will affect service levels and delivery.

SLAs should outline which divisions within ESPs' organizations are responsible for service delivery. Here, ESPs show what the help desk groups, the network control center groups and the field services units will deliver. Ultimately, end users are not concerned with who performs the service, but this information helps IT departments understand how the services are provided.

Decide Whether to Transfer Assets. True outsourcing requires a transfer of assets from clients to ESPs. Some ESPs prefer to own clients' routers, hubs and servers. This ensures a base standardization level that facilitates service delivery and keeps costs down. For the highest performance, ESPs might require asset transfer. Interestingly, ESPs rarely own clients' desktops because of skill set or political issues. The decision on whether to transfer assets depends on how willing IT departments are to cede their technology directions to outside ESPs. Although asset transfer might yield higher service levels, it comes at the cost of being able to independently control the infrastructure. ESPs control the introduction of new technologies into the network environment. If IT departments decide to transfer their assets, they should be confident in the ESP's technology directions and still play an active role in strategic planning.

Review the Vendor's Pricing Algorithms. The formation of SLAs and corresponding reports requires an experience level with distributed environments that most services providers have only with data centers. The same expertise is necessary to develop an effective pricing strategy for network services. A clear pricing methodology is a good indicator that vendors have the flexibility to adjust to clients' dynamic needs. This is particularly relevant given most vendors' strategy of expanding the services they provide once vendors establish their value.

Most vendors price their network services on a per-user basis. Periodic services, such as electronic software distribution, are priced separately on a per-event basis. The variables influencing vendors' pricing include the complexity of the service discipline, the number of



nodes managed, required service levels and the complexity of the resource being managed. Within any organization, different business units will have different service-level needs. In a bank, for example, the traders require a higher level of availability than employees in the marketing department. Vendors should be able to adjust their prices given varied end users needs. We suggest that IT departments urge vendors to provide better service levels than the internal network group and achieve at least 20 percent cost savings.

Manage End Users' Expectations. Typically, the level of service users expect from IT departments is higher than it can deliver. Given this predicament, the best way to manage end users' expectations is through SLAs. Users should be a part of the negotiation process establishing SLAs, regardless of whether internal IT departments or services providers will be responsible. End users should also provide ongoing feedback on areas that need improvement. Naturally, most users are apprehensive about bringing in outside vendors to supply services they need to do their job. To quell these fears, vendors have to meet (or surpass) end users' expectations.

When external vendors are contracted, users should be made aware of the shock period that occurs at the inception of most network service deals. This is a time of adjustment as vendors struggle to stabilize the clients' environments to enable higher service levels in the future. The first 90 days of a network service contract are the most critical to the project's success. The vendors have to balance the need for infrastructure improvements against users' needs for uninterrupted network access. It will be important for vendors to display a continuous improvement attitude, with maximizing end-user satisfaction as the goal.

Require Detailed Service-Level Reporting. Service-level reporting measures how well the vendors perform against their initial commitments in the SLAs. The reports should address each of the subscribed services. The reports should also be actionable. Each month, problem areas should be prioritized and solutions outlined. Additionally, service-level reports are useful tools for capacity planning, because they show where upgrades need to be made in the network.

Service-level reporting gives IT departments some control over the future of the partnership. One way this is achieved is by tying vendor compensation to specific performance thresholds. A possible arrangement is having the vendor contribute to an escrow account. If service levels fall below the baseline, the client is entitled to a portion of the escrow. An alternate approach would be to share additional revenue generated by the network partnership. Few vendors, however, are capable of gathering quantitative data to illustrate their performance; fewer still are willing to stake their compensation on the fulfillment of service levels.

#### **2.2.2.1. Network Outsourcer Motives**

It is useful to understand the revenue and profit motive for a typical network outsourcer. This is accomplished through non-people-dependent means and through people-dependent means:



- Non-people-dependent means—network outsourcing vendors will make a profit from non-people-dependent means through network operations by charging for hardware and software at levels sufficiently above the vendor's cost for financing those hardware and software assets. The vendor's revenue and profits will be achieved from network operations when the fee for underlying network services charged to a network outsourcing client is sufficiently above the charge the network outsourcing vendor pays its underlying carrier. A smart network outsourcing vendor will have a graduated discount schedule with its carrier that increases the discount and, therefore, reduces the rates the network outsourcing vendor pays for carrier services as the total business volume and usage of the carrier's services increases. The spread between the rate the network outsourcer pays the carrier and the fee the network outsourcing vendor charges its network outsourcing client will yield the network outsourcing vendor's revenue and profits. Finally, these vendors will obtain revenue and profits from the volume of equipment or software resale they achieve via a finite list of preferred network element vendors.
- People-dependent means—since a network outsourcing vendor's employees will not be less expensive than a client's employees, profits will be achieved by (ironically) relying less on people and more on network operational tools to perform diagnostic, service restoration, preventative and maintenance functions. Therefore, the remaining number of network outsourcing people working on a client's network operational environment will be fewer than the client relied upon prior to outsourcing its network.
- The real people-dependent revenue and profits (and the greatest revenue streams and profit margins) for a network outsourcing vendor will come from the activities involved with planning, designing and implementing of networked environments. Again, in these activities, profitability will be achieved through the utilization of tools to perform the tasks. However, when a network outsourcing vendor's staff is engaged in any activity, maximum profitability from people-dependent activities will rely upon those employing process management techniques and avoiding the time-consuming and "profit-killing" crisis management techniques used by many clients. Our belief that the tasks of network planning, designing and implementing "is where the money is" is often proven by network outsourcing vendors of all profit orientations telling us that they would probably decline a network outsourcing arrangement that only included network operations.

***Recommendation (G5). Gartner Group recommends that DIT and its replacement consider the network outsourcing process and the motives of a network outsourcer outlined above when proceeding with any network-related outsourcing project.***



## 2.3. PRIVATIZATION MAY BE VIABLE FOR SOME SELECTED SERVICES

### 2.3.1. Academic Outsourcing Rationale

While this report recommends no large-scale outsourcing arrangements, we feel that there are several operations/areas which are privatization candidates and more which might be in the future. We first present a set of circumstances under which outsourcing makes sense:

- Process in Question is of Low-Value Added—low-value added processes typically consume resources with little pay-back. These processes are of “commodity nature” and hence do not provide value to the Commonwealth’s operation. PC maintenance is an example of this type of low-value added process.
- Process/Technology in Question Represent Significant Investments—should the desired process/technology represent a significant investment, then it is a candidate for outsourcing. Examples include the creation of a WAN, where true ownership of such an entity would require right-of-way acquisition through to cable-laying. Microwave investments would be as significant. Certain new mainframe/processor acquisitions also represent opportunities for outsourcing as the capital requirements are significant.
- Cost—if the process/technology is substantially less expensive via an outsourcing arrangement, and quality recognized as high, then this can contribute to a decision to outsource.
- Internal Quality Issues—should an internal process/technology have significant and widely acknowledge quality issues, then it is a subject for outsourcing. Outsourcing in such a circumstance serves to remedy the situation and serves as a motivation for similar process/technology areas.

### 2.3.2. Where Could the Commonwealth Privatize?

Gartner Group recommends privatization arrangements be considered in the following areas:

- **Personal Computer (PC) Maintenance**—for locations with significant Commonwealth presence, outsourcing this process represents a positive decision. Once the proper agency IT organizations are in place in most of the agencies, this option would make sense (more detail is located later in Section 4 of this document). Geographic locations where privatization of PC maintenance would make sense include Richmond, Northern Virginia, Tidewater Area and possibly Roanoke.
- **Applications Development**—while already outsourced to some degree, Gartner Group believes that this area represents an opportunity to acquire the resources as needed/on-demand which are considered to be state-of-the-art. Many organizations are successful with major applications development projects through effective use of external programming expertise. This includes a spectrum of services from spot programming resources to full-blown custom development and



packaged applications acquisition and implementation. Maintenance of applications is achievable through such a strategy as well.

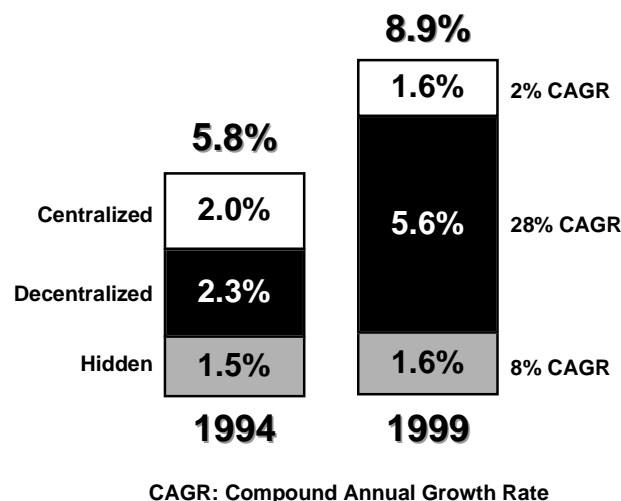
- Desktop—the PC maintenance function was considered above. There are other areas relating to the desktop which are discussed below.

### 2.3.3. Desktop Outsourcing

A potential area for outsourcing in State government is the desktop environment. We begin our discussion on the issue of desktop expenses. Expenses for desktop and distributed computing may be spread among DIT, agency IT staff and agency end-user departments. Consequently, the Commonwealth probably does not know the total cost of providing these services on an internal basis (see Figure 19).

Figure 19 illustrates that spending on desktops is growing dramatically. Centralized processing is projected in 1999 by a Gartner Group budget survey to be only 1.6 percent of the 8.9 percent growth rate for IT expenditures. Although this number grows at a compound rate, the figures can be confusing because the 1.6 percent is of revenue, and the revenue will increase. Decentralized spending, which includes the desktop, is projected to grow at 28 percent on a compound annual growth basis. This is a huge area of growth that IT departments can control.

The key here is that in most of the agencies interviewed (and in those organizations surveyed), there is an underground support team. When a PC on a desktop goes down, for whatever reason, a good deal of department staff may become involved—they will congregate around the failed desktop and offer advice. Because of a lack of confidence in the enterprise help desk, there are often end users recognized as being highly skilled to whom coworkers turn for help.



Source: Gartner Group

Figure 19. Growth Rates in Desktop Support Costs



Our discussion continues now with definitions of the types of desktop outsourcing. The first point is that our previously defined term for IT outsourcing includes the transfer of IT assets, including personnel. Although the transfer of assets is not usually the case at the desktop, the term “desktop outsourcing” encompasses all services provided to support and manage the desktop including:

- **Procurement.** Complete desktop outsourcing services include hardware and software acquisition, commonly called procurement. This involves dealing with the resellers or the manufacturers of products and services, getting orders configured properly and delivered on a timely basis.

In ever-increasing amounts of products and services, best-in-class practices include using an electronic catalogue, which can be viewed by the business-unit executives. Electronic catalogues typically highlight the preferred configuration and give alternatives for configurations that are needed to perform the business function. By using an electronic catalogue, best-in-class practices also include using some type of workgroup software (e.g., Lotus Notes) that actually helps create a purchase order. The purchase order then moves through the enterprise for the appropriate sign-offs, out through a service provider that communicates electronically to the reseller or manufacturer of the product or service, which has the product configured, delivered to the desktop, billed electronically and electronically updates an asset management database.

Regardless of the Commonwealth’s strategy regarding desktop outsourcing, we do recommend that the current IT contracts under the auspices of the Division of Purchasing and Supply be automated and made available through the Internet/Intranet or by some other means. This effort would include the ability to search the contracts easily.

- **Asset Management.** This service is concerned with understanding the life cycle of the products and services—and the human resources capital or assets—that an enterprise employs and capturing that information in an open electronic database. Enterprises have found that it is important to understand all the details of a product (e.g., the warranty, the feeds and speeds on the computer and the amount of memory available). When the enterprise wants to perform an upgrade (e.g., to Microsoft Office 97), the upgrade may require more memory or more disk capacity. The IT organization personnel can then access information in an open database, which can be probed to find out which machines, software and skills need to be upgraded. This enables the IT organization to develop a training path and fast-paced application deployment.

It is also essential to supply information into the finance/accounting department to provide proper billing and depreciation allowances; capture MACs; and develop some technique for managing technology refreshes for hardware and software on the desktop. Asset management is a huge function that different service providers and enterprises are just beginning to exploit to achieve cost savings on the total cost of ownership (TCO) of PCs.

- **Maintenance.** Maintenance for desktop hardware is a classic type of service provision that entails responding to calls concerning broken desktop systems from



end users who do not know how fix the problem. The maintenance organization dispatches a technician to fix either a hardware or a software item. Above we recommended outsourcing of this function, already being done in many State agencies.

- **Deployment.** This service involves introducing new or replacement technology (e.g., the development of a new application to be deployed across the enterprise's infrastructure). Enterprises need to have tools and best practices to handle such things as application building, file conversion, security, virus protection, firewalls, Internet access and the deployment of other technology that requires skilled technicians.
- **Help Desk.** Generally the area that is the Achilles' heel of IT departments for a variety of reasons, the help desk is the first line of desktop support and the voice of the IT department that end users hear. Unfortunately, IT help desks are often understaffed because of budgetary pressure. IT professionals and executives who are forced to decide whether they are going to hire another help desk person, or whether they are going to hire an applications development person, often opt for the application development person.

As a result, end users generally report dismal help desk response, with many end users reporting times measured in days for a response from the help desk. With its reputation on the line, the IT organization needs to develop a responsive Tier 1 help desk. The Tier 1 help desk is designed to assist with shrink-wrapped applications and relatively standard problems, or simply dispatch maintenance personnel.

A Tier 2 help desk provides additional application drill down assistance and, perhaps, handle specific applications. A Tier 3 help desk would include the actual debugging areas. Typically, desktop outsourcing includes the levels of the Tier 1 and Tier 2 help desks. The wide ranges of response times and varying levels of service from established outsourcers indicate that training issues, high employee turnover rates and lack of facilities plague vendors in this market.

- **Training.** Training is one element that most desktop outsourcing deals do not include. In looking toward the future, however, training will become more important as enterprises recognize that the classroom training months before a product is rolled out is quickly forgotten by end users who then flood the help desk with calls during the roll-out. Therefore, just-in-time training (JIT)—particularly computer-based training for shrink-wrapped applications—is a tool that is required for a complete desktop outsourcing solution.

The actual sourcing decision requires careful analysis, beginning with identifying the IT functions that are required. These decisions should be made by the Chief Technology Officer and the agency IT managers, (as discussed later in this report) and related business units, not by a persuasive vendor.

For each function, the Commonwealth should consider whether the function's overall performance is acceptable or unacceptable by using conventional survey techniques. The next step is to determine what the potential is for the Commonwealth to reduce costs





or improve the function's performance. After that, it is necessary to determine what the level of risk is if the function is outsourced to an external provider. Finally, the Commonwealth must decide whether the function is a candidate for external sourcing. This process needs to be kept at a level high enough to prevent it from getting bogged down in details about performance and costs. The objective is to determine if external sourcing should be considered, not to rate individual functions or make the final sourcing decision.

We have performed this assessment for the Commonwealth, and have arrived at this following summary:

**Table 7. Desktop Outsourcing Recommendations**

Area	Assessment	Cost Change	Performance Change	Risk	Consider ESP?
Acquisition	Good	Moderate	Minor	Low	No
Asset Management	Poor	Major	Significant	Low	Probably
Maintenance	Varies, good to poor	Minor	Significant	Moderate	Yes
Deployment	Varies, good to fair	Minor	Minor	Moderate	Probably
Help Desk	Varies, good to poor	Moderate	Significant	Low	Yes
Training	Varies, good to fair	Low	Moderate	Low	Yes

Source: Gartner Group

***Recommendation (G6). The Virginia General Assembly may wish to direct the Secretary of Administration to evaluate the feasibility of outsourcing systems development and desktop computing acquisition and support services. The Secretary should proceed with outsourcing such services if, after thorough evaluation, privatization is found beneficial.***

#### **2.3.4. A Uniform Decision Process is Needed**

##### **2.3.4.1. Current Privatization Initiatives**

At the time of this draft, presented to JLARC in September, a privatization effort originating from the Department of Planning and Budget was being initiated. While we do not have detail on this effort, and believe the effort may not have the support on many managers within the Commonwealth, the process employed may not be well planned. Much of the current process depends upon possible outsourcing vendors, and as such may not represent the best interests of the Commonwealth.



***Recommendation (G7). The General Assembly may wish to establish by law the process which shall be used to privatize information technology functions or services in State government.***

#### **2.3.4.2. Fourteen-Step Outsourcing Process**

In addition to the best practices identified by Gartner Group, a 14-step process is proposed for information technology outsourcing. This process has been developed by the Gartner Group to help organizations which proceed with outsourcing to do those things which will enhance the likelihood of success. The process, as discussed below, draws on the experiences of many organizations which have attempted or successfully completed outsourcing arrangements. The process is as follows:

1. Start with an IT sourcing plan. Outsourcing decisions should be made within the context of a larger IT sourcing plan, not in a vacuum. This sourcing plan, which should be updated annually, can help users determine how best to obtain their required IT resources over time. This involves assessing current resources by IT function, and then deciding whether to hire and train in-house talent or to augment or replace these resources by using ESPs.
2. Set objectives, and communicate them to prospective vendors. The evaluation team must agree on and articulate its objectives. Frequently, however, evaluation team members are unclear or in conflict about what they hope to get out of the deal. If the client cannot express its expectations and priorities to its vendors, the vendor cannot be expected to achieve them. The more information the vendor has, the better it can create a proposal to meet the customer's needs.
3. Leave enough time to properly perform the evaluation and choose a vendor. Too many executives, excited at the prospect of cost savings or the ability to shed IT responsibilities (which they consider important but not their core business), set unreasonable time limits for evaluating outsourcing and choosing a vendor. Performing an outsourcing evaluation in inadequate time is one of the top five reasons that these deals fail.
4. Follow a disciplined, intensive evaluation process. Following a disciplined evaluation process is vital to the success of the future outsourcing deal, but few users follow this simple suggestion completely. Customers often underestimate the difficulty of this step and the impact of organizational politics. Many simply call up one or two vendors and ask them to submit a proposal, often without preparing evaluation criteria or revealing essential information, such as budgets, equipment prices and staffing levels. Somehow they expect the vendors to divine the key information, to create a proposal that reflects their needs, and to tie it all together with a reasonable (and low) price.
5. Hire experienced consultants and attorneys, and be familiar with the state of the art in outsourcing contracts. Inadequate contractual protection is also one of the top five reasons that the deals we see are in trouble. Outsourcing consultants and attorneys



are constantly “pushing the envelope,” and redefining the terms and conditions to which vendors will agree. Users must be aware of these new provisions, or they will continue to experience the same problems. However, most users and in-house attorneys cannot do this on their own.

6. Choose a vendor that the Commonwealth can live with indefinitely. Vendors vary significantly with respect to culture, attitudes toward profit margins, and other characteristics. Choosing a vendor that has a culture similar to the customer’s, and one that the customer trusts, is probably the first factor in making these deals successful. We have always believed, for example, that the attitude of trust and respect that exists between ISSC and Eastman Kodak Co. is one of the major reasons that this outsourcing relationship has worked so well.
7. Retain approval over the hiring and transferring of the account manager and account team. Users must also have trust in, and respect for, the account manager and account team. Even an excellent vendor may have poor account managers, or ones whose skills do not match the customer’s unique requirements. Further, account managers have their own objectives (e.g., to increase revenues or improve profit margins), which may be at odds with the customer’s interests. Some of our clients do not realize that they may be able to transfer unacceptable or under performing account members off the account; instead, they allow their frustrations to slowly build without sending a “red flag” up the vendor’s management chain.
8. Make the scope well-defined. A clear and comprehensive definition of the scope of services to be covered is critical. However, contracts often simply state that the vendor will provide the same services currently performed by the user. Consequently, there is often significant misunderstanding between vendor and customer regarding the scope of services and functions to be provided, which usually works in favor of the vendor. For example, one client was charged almost \$500,000 during the first month of its deal for services that management assumed were covered. The greater the specificity involving the scope of the services (in both the RFP and the contract), the easier it will be to ensure a smooth operation or to avoid disagreements about what the vendor was committed to do.
9. Avoid the partnership trap. Most vendors talk about trust and partnerships (as in “trust me, I’m your partner”). We have seen normally tough-nosed executives fall prey to the partnership argument and neglect to adequately protect their company in the contract. Yet most of these deals are not true partnerships (as defined by having mutual economic consequences), and therefore the relationship must be backed up by precise (not vague) contractual terms and conditions. Even in the best relationships, the potential for conflict between the vendor’s profit motive and the client’s needs will arise.
10. Put the three service fundamentals in the contract. The customer must always remember the three fundamental elements of the outsourcing relationship when writing a contract: services to be performed; price for those services; and performance



standards associated with each service. While this sounds like a simple mandate, the majority of contracts that we see fail to do this adequately and experience related problems later on.

11. Define and enforce measurable SLAs. Many outsourcing customers do not have SLAs at the time they sign the contract. Instead, they agree that the vendor will define the SLAs in the first six months of the deal. However, three years later, these SLAs are often still undefined, leaving the customer unable to obtain reasonable performance levels or to levy associated penalties.
12. Think carefully about how to manage the deal before the contract is signed. Few users think sufficiently about this before the fact. Many of the problems we have observed are caused by inadequate management of the deal. Organizational, process and contractual mechanisms are often ignored, resulting in significant problems after the contract is signed.
13. Retain sufficient in-house staff to manage the deal. Do not transfer or fire the entire staff. Frequently, too few people (and particularly good people) are left behind to manage the deal. We have clients that do not even have enough staff to gather sufficient statistics to demonstrate inadequate performance on the part of the vendor. We have other clients that have no way to determine whether systems such as DB2 or CISC are performing adequately, and whether they have been properly tuned. (The latter issue is particularly important for companies that are being charged for all CPU and direct access storage device [DASD] resources they consume.) We also have clients that, because they have no technical expertise left on staff, cannot even determine what functions the vendor should be performing.
14. Plan for change. There is not a single outsourcing deal that has not changed dramatically from what the customer envisioned when the deal started, either because the business or the technology itself changed. Yet few companies understand how to protect themselves in the contract from both planned change and change that they cannot even begin to imagine.



**CHAPTER III**  
**MANAGEMENT OF INFORMATION**  
**TECHNOLOGY IN VIRGINIA**  
**STATE GOVERNMENT**



### 3. MANAGEMENT OF INFORMATION TECHNOLOGY IN VIRGINIA STATE GOVERNMENT

#### 3.1. BETTER MANAGEMENT OF TECHNOLOGY RESOURCES IS NEEDED

This section of our report encompasses many information and technology areas. The common thread are recommendations which are intended to improve the management of the Commonwealth's IT resources.

##### 3.1.1. Concerns About Costs/Budgeting/Cost Recovery

DIT currently has a cost recovery system typical of many chargeback organizations. Costs are charged directly, based upon CPU minute, pages printed and the like, for the mainframe services. Telecommunications charges are based upon vendor charges (for voice) plus an indirect charge assessed as a percentage of the total charges or (for data) per connection to the Frame Relay cloud.

We have conducted a review of the DIT chargeback system and have outlined our findings below:

- Documented rate development methodology is, in principle, clear, rational, equitable, and is consistent with general IT industry practices. Key principles are documented in the Cost Allocation Plan (1996-1998 Biennium):

"Rates associated with [IT services] billing algorithms...approximate the actual expenses incurred in providing each service." (Agency Financial Policies, II-1)

"It is recognized that, in the process of setting rates for data processing, systems development, and telecommunications services, both historic and projected utilization and cost data must be considered. The combination of these elements, over extended periods of time, can result in over- and under-recoveries. In the event that the billing process results in over-recovery, rates are reduced to prevent further over-accumulation and to deplete the existing over-recovery.

"If the billing process results in an under-recovery, requests for supplemental funds through rate increases may be made to the customers of the affected service. The DIT reconciles costs incurred by function on a monthly basis to evaluate fund balance accumulation and the effectiveness of published rates, and to identify any rate adjustments that would be required to correct actual or projected over/under recoveries. Rate adjustments are made on an annual or more frequent basis." (Agency Financial Policies, II-1,2)

"For billing purposes, the DIT operates two shifts, with the prime shift beginning at 6:00 a.m. and ending at 6 p.m. on weekdays. At any other time there is a 25 percent reduction in the cost of computer jobs. This shift discount was implemented to accomplish a management objective of normalizing workload across all shifts to delay procurement of additional equipment required to support



the peak processing period” (Computer Services Algorithms, III-1).

- The rate development methodology is well documented and should be easily understood by both technical and non-technical audiences.
- Rate pools are explicitly documented.
- The Computer Services Algorithms rate elements are generally understandable, but some could be replaced by less technical measures (e.g., tape EXCPs could be replaced by tape mounts).

There are several concerns about this approach that were raised during our data collection efforts and agency interviews:

- There is a concern that a full-cost recovery model results in higher costs than should be expected. Gartner Group’s position is that it is not the full-cost recovery model that is at fault, if in fact the concern is true, but that there should be a series of checks and balances on DIT’s cost-effectiveness. One approach is the free market model, which would give agencies freedom of choice in selecting an IT service provider. The only way that DIT could stay in business would be if DIT were cost-effective. A second approach is the measurement model, which periodically measures and compares (benchmarking) DIT’s rates against peers. DIT would then be directed to find ways to keep costs competitive relative to other organizations.
- There is a concern that DIT is perhaps setting rates too high at the beginning of the year, allowing them to provide a substantial refund or transfer to the general fund. Gartner Group’s position is that most chargeback rate development is designed for a slight over-recovery, since it is generally easier to rebate money than to ask for additional funding at the end of the fiscal year. The size of the cushion tends to be directly proportional to the lack of certainty in forecasting usage (in other words, if usage projections are unknown or known to be generally incorrect, the size of the cushion will be larger than if usage projections are known with much certainty). So, it is possible that the root of this problem is as much with the agency forecasting process as it is with DIT’s model and methods.
- There is a concern that the process may be too complex, resulting in too much overhead. Gartner Group’s position is that a lot of the monitoring that needs to be done to provide a good chargeback system is also necessary to adequately manage an IT function. As stated above, some of the rate structure is more detailed than perhaps optimal and there may be ways to streamline the process, but there are no obvious red flags in the model.
- There is a concern that DIT is performing functions that are in fact not needed, either because they are redundant with functions performed by agencies or because they are not adding value, in the telecommunications area. Gartner Group agrees with this position and makes further recommendations later in this report.



Recommendations to address these issues are provided in Chapter 4.

### **3.1.2. Procurement, Much Improved, Should Consider New Approaches**

#### **3.1.2.1. *Performance-Based Procurement***

We first discuss a recent procurement success story at another state, the State of California. This discussion outlines what was done in California to address non-performance in the vendor community. We believe that this strategy has possibilities for the Commonwealth. In 1994, California's Franchise Tax Board (FTB) completed 18 months of strategic planning that revealed a critical need to accelerate the deployment of IT to reduce the state's revenue loss, estimated at \$2.7 billion annually, from uncollected taxes.

The problem the FTB faced was that it did not have the in-house expertise necessary to develop and implement appropriate IT solutions to enable more efficient tax collection, and it did not have the funding needed to acquire IT through the normal procurement process.

The FTB hence volunteered to develop and test a new procurement model that would help provide business solutions and improve management for large, high-risk projects. Called Performance-Based Procurement (PBP), this model calls for strategic partnerships with qualified vendors in developing business-driven solutions that represent best value, not lowest cost, for the state. Instead of the usual adversarial relationships with vendors, it emphasizes long-term, mutually beneficial business relationships based on trust, honest and open communications, and teamwork. Instead of the state bearing the financial risks of potentially unworkable solutions, PBP provides for payment to the vendor only if and when benefits are realized after implementation of the proposed solution.

The PBP process begins by identifying a business challenge. Rather than proceed with an exhaustive analysis of the challenge and development of detailed specifications for a solution by agency staff, as with typical IT procurements, the PBP process establishes a group of qualified business partners who have the expertise and resources to help provide solutions. Each partner is invited to work along with agency staff in investigating the challenge more fully, identifying alternative approaches and developing the requirements for best-of-breed solutions. Detailed competitive proposals are then submitted for review by agency staff. The evaluation criteria are set to ensure best value, based on quality of solution, risks and benefits. When a winning proposal has been selected, the agency enters into contract negotiations with the vendor to determine deliverables, schedules, project management, costs and payments. Payment is contingent on actual achievement of benefits, and those benefits are the source of funding for vendor payments.





Once the project solution, project plan and funding plan have been finalized, they must be approved by the appropriate authorizing entities. The PBP process provides more accurate information about costs and benefits at this point than the upfront project authorization and funding approval built into traditional government procurements. Risks are reduced commensurably with PBP. The final step is project development, but there are also some differences in the PBP approach to this phase. Because the business partner is involved in project management decisions and there is a mutual interest between agency staff and business partner staff in achieving a workable solution within the agreed on time and cost constraints, challenges are resolved and changes are determined through consensus and negotiation. A team atmosphere prevails, not one of us vs. them.

FTB awarded its first contract to a vendor at the end of April 1994. Ten months later, this vendor delivered the first phase of its solution, the Collection Account Processing System (CAPS), an adaptation of proprietary software it had developed for the financial industry. Within four months, benefits of nearly \$13 million were achieved. Two additional phases were completed by March 1996, and in the ensuing months, CAPS has generated incremental revenues of more than \$38 million per year, a tremendous rate of return on the \$5.2 million project cost. Subsequently, FTB has awarded another contract to this vendor to implement a Pass-Through Entity Automated Screening and Support System (PASS), the next phase of California's revenue collection modernization. When the \$23 million PASS is completed, it should increase the state's revenues by more than \$200 million in the first five years of use.

It is this type of procurement which is being attempted at the Virginia Department of Taxation. The concepts of risk sharing and payment of the vendor through increased revenue is being discussed for possible inclusion in the contract. While there are few agencies which actually realize a revenue (Lottery, Motor Vehicles, Taxation), which might imply few opportunities for PBP, this is not actually the case. Any agency for which cost savings might be realized and measured objectively and reliably, is a candidate for such PBP.

### **3.1.2.2. The P-Card**

Another possible area of improvement is through the use of the P-cards. We discuss the P-card as a possible option for those items which are already under contract with the Division of Purchases and Supply. P-cards are special-purpose credit cards used for low-value purchasing. They are issued by the major credit card companies (e.g., Visa, MasterCard and American Express). Government agencies in Canada and the United States were the first to test this tool, which corporations have since embraced as an alternative to traditional requisition, purchase order, payment request paper cycles, and as an alternative to EDI for smaller purchases. Enterprises process millions of invoices each year, with typically 75 percent of them for items costing less than \$1,000. Some agencies use this concept now, we understand.



A recent U.S. Government General Accounting Office (GAO) study of 12 civilian and defense agencies, which are responsible for 87 percent of agency P-card procurements, found savings of between one-third and one-half in the administrative costs of micropurchases (under \$2,500).

P-cards offer a number of benefits:

- **Cost savings:** Earlier studies reported that P-cards reduce the costs of small purchases by \$150 to \$200 by reducing associated procedures and paperwork. The GAO study found savings of \$22 per transaction at the U.S. Postal Service, which is the second largest card user. The Department of Agriculture cut its processing costs from \$77 to \$32 per transaction. Other agencies reported savings ranging from \$2 to more than \$140 per transaction. The variables hinge partly on how efficient procedures are within the enterprise.

When paying via financial EDI, the costs of check requests and dealing with lost payments are avoided. Using P-cards instead of EDI purchase orders reduces VAN charges. Chevron estimates that using P-cards will save it \$5 million per year in supplier discounts and reduced processing. Purchasing staff can be reduced. Some issuers offer rebates for electronic payment.

- **Negotiated prices:** By offering rapid payment to the supplier, rather than the traditional net 30 days until payment is due, enterprises can negotiate better prices. However, forgoing the 30-day float may offset some of the operational savings. Furthermore, suppliers must pay a 2-percent to 3-percent processing fee for each sale, but they are usually willing to do this because of faster settlement directly from the card issuer. Management reports can be used to analyze spending, monitor policy compliance and negotiate with suppliers.
- **Management reports:** The enterprise receives monthly detailed consolidated invoices (optionally in EDI formats) from the credit card issuer for all purchases. Details vary significantly by issuer. The enterprise can pay the issuer through financial EDI at less cost than using paper checks—assuming that the enterprise is set up for financial EDI for other applications. If not, a debit approach may be taken with the card issuer “taking” the funds from a designated account, with prior authorization. Employees using the card receive a report verifying transactions.
- **Management benefits:** Enterprise procurement managers can focus on strategic planning and supplier partnerships, rather than on routine processing. The GAO report found that P-cards enabled agencies to fulfill their missions more efficiently, while absorbing the impact of administrative staffing reductions required under the Federal Workforce Restructuring Act of 1994.

However, despite these benefits, P-cards do have a few potential problems, which are outlined below:

- **Leakage:** Nearly 30 percent of P-card purchases are made by employees outside of a company’s established purchasing procedures. These procurements



can cost 15 percent to 20 percent more than purchases made through an enterprise's negotiated supplier contracts at discount prices.

- Potential for abuse: A recent GAO study found no pattern of P-card abuse, but did note needs for procedures and reviews to prevent failures to record purchases of accountable property. This suggests a need to integrate P-card data with asset management applications. As an example of how to deal with the audit trails, the Postal Inspection Service, a high-volume user of the P-card, has created surveillance software allowing analysis of thousands of card transactions with limited resources.
- Requirements for reporting hazardous materials: The enterprise must ensure that employees know what not to buy. Receiving departments must have controls in place and conduct spot checks on materials entering plants. The individual who is purchasing material is responsible for insuring compliance with EPA-type reports. In addition, company locations should forward the transaction summary provided by the P-card issuer to the procurement department for commercial review, and to corporate industrial hygienists for hazardous material review.
- Reporting for minority-owned, women-owned and disadvantaged businesses: Few P-card programs track these types of businesses, so the card issuer or users may need to manually process transactions if their firms have community purchasing policies, or are government enterprises requiring this information.
- Payments to individuals: Few P-card programs track payments to individuals who work for themselves. This information is required for 1099 reporting.
- Data integrated into accounting systems: The information sent to corporations and government agencies by the P-card issuers is often insufficient to reconcile the purchase. In addition to data integration for oversight responsibilities, P-card data is needed to support departmental chargebacks on purchased goods and services. Some of the P-card issuers are providing consulting services, software for coding and entering purchase data into general ledgers, and analytical software. A mapping requirement must be addressed with tools or by custom coding.
- Administrative Overhead: Although P-cards can reduce procurement costs by streamlining functions, as the issues above demonstrate, enterprise overhead must be allocated to manage the P-card program. Enterprises should not assume the issuer can, or should, take over these administrative responsibilities.

***Recommendation (G8). The Virginia General Assembly may wish to direct the Department of General Services to evaluate the feasibility of using alternative approaches to procurement of information technology goods and services. Among the approaches which should be examined are performance-based procurement and a statewide, mandatory procurement card (P-card) program for small purchases.***



### 3.1.3. Long-Term View of Multiple Platforms for Mainframe Processing

Currently, there are three processing platforms in the data center at DIT. Two operational and one currently being created/implemented. The Unisys mainframe data operation and the IBM mainframe represent the core processing platforms. The IBM mainframe is used by many different agencies for their particular individual needs and by the Commonwealth overall for applications likes CARS and CIPPS. The Unisys mainframe is used primarily for the Department of Social Services and the Board of Elections.

The mainframe processing environment most certainly has a place in the Commonwealth. The investment in capital for these processors, DASD, printers, communications, etc. is significant. Additionally, the investment in personnel, based upon both the experience at DIT and at the agencies, is extensive. This experience is both generic to the processors involved and specific to the implementation, programs and configuration in the Commonwealth. Most importantly, the recommendation was made previously not to privatize this function.

#### 3.1.3.1. IBM Mainframe

Accepting then that the mainframe is given in the Commonwealth environment, we turn our attention to the issue of which platforms are in the best interest of the Commonwealth over the long term. Clearly, the IBM mainframe has a preponderance of the market share, by any metric used. Our data collection efforts indicated a reliance and investment in the IBM mainframe environment. Lastly, while client/server computing continues to capture the majority of platform-related trade press, the mainframe remains a viable platform for large-scale applications processing. Its maturity, scalability and reliability, combined with the breadth of resources (capital and human) available to support it tend to render it a solid solution.

***Recommendation (G9). This discussion, combined with the relative efficiency with which the Commonwealth operates the IBM platform, leads Gartner Group to recommend its (the IBM mainframe) continued use as a computing resource over the next five years. Changes need to be made to this environment, with recommendations provided below.***

#### 3.1.3.2. Data Center Recommendations

##### 3.1.3.2.1. Unisys Mainframe

Turning our attention to the Unisys environment, we make several observations regarding its use now at the Commonwealth and its perceived future as well:

- The Unisys environment is not viewed as a platform for use in new IT projects.
- The ADAPT project required additional processing capacity and the



decision was made to transfer some of the processing off to an alternative Unix platform (a Unisys processor upgrade occurred as well).

- The CIM issued a letter several years ago recommending the discontinuance of the Unisys mainframe as a strategic platform.

Our analysis leads us to similar conclusions. The proprietary and dated nature of the Unisys environment combined with its non-consideration for new projects leads Gartner Group to conclude that it should be considered to be a legacy platform and that all applications should be migrated toward alternate platforms (this recommendation is made specifically to DIT's replacement).

The challenge, however, is the ADAPT project which is being implemented now and is deemed a critical application. The investment and operation of ADAPT will continue until at least 2005, the expected life of this application. Based upon this, we recommend the migration of all applications, with the exception of ADAPT, to alternative platforms. This should be accomplished by 2002. ADAPT will be migrated to an alternative platform beginning in 2004 and complete in 2006.

We further recommend the establishment of a \$2.5 million fund (dollar amount based upon our data collection findings) to finance this effort as a supplement to agency funds for this purpose. This fund would be available to all agencies with significant investment in Unisys technology. The agencies would apply for a grant out of this fund to assist with their migration efforts. The funds, however, can only be spent on new applications or applications development efforts. Any processing removed from the Unisys environment should be destined for another DIT-managed processor.

***Recommendation (G10). The General Assembly may wish to direct that use of the Unisys mainframe be discontinued by the year 2002, with the exception of the ADAPT system at the Department of Social Services. To facilitate migration of systems to other computer platforms, the General Assembly may wish to create a fund from which agencies may receive grants for development costs.***

#### **3.1.3.2.2. Data Center Recommendations**

***Recommendation (G11). The following set of recommendations are intended to improve the overall operation of the data center at DIT, and are directed towards the DIT replacement; they are essentially independent of the recommendations provided regarding the organization of DIT.***



- *Investigate the use of OS390 and CMOS hardware.*
- *Allow a fewer number of versions within each software class/product.*
- *Consider implementing a software asset management process to address the issue above and other related issues.*
- *Attempt to control or encourage a more efficient use of the mainframe processor.*

### **3.1.4. Growth of Agency-Sponsored Networks**

The core telecommunications network in existence in the state today is the CTN. This data network is based on a Frame Relay service with connections to all major agency locations. The network is provided via DIT and is charged for based upon the connection to the Frame Relay cloud. These connections are based upon a given data rate, and are independent of usage.

There are other agency sponsored networks as well. The most developed at this point is the ATM network developed and sponsored by Virginia Tech. As described earlier, the network is primarily for the use of the educational institutions, including the University of Virginia and the community college system. The network was originally consider a pilot, but has quickly become a production environment, with certain executive branch agencies using the network (more on this later).

Next, we present the wide area data network benchmark results as further discussion of this issue and as precursor to recommendation we will make.

### **3.1.5. Wide Area Data Network Benchmark**

#### **3.1.5.1. Methodology**

The Real Decisions group within the Gartner Group performed a benchmark on the CTN, examining both the hierarchical network (SNA) and the multiprotocol network (TCP/IP). This benchmark developed a number of comparison metrics and charts, much as the data center benchmark did, in an effort to provide a report card of the CTN.

Several relevant points should be made prior to presentation of the benchmark results:

- The study reflects 1996 data
- The hierarchical network component consists of networks of the following agencies: DIT, DMAS, DSS, the Courts.
- The multiprotocol network component consists of networks of these four agencies: DIT, DMV, VDOT and DMAS.
- The scope of the study included:
  - Only Commonwealth's Hierarchical and Multiprotocol networks



- The scope of the study excluded:
  - LAN Infrastructure and desktop support
  - Voice services
  - Other agency-specific networks
- Cost and workload information was provided by six agencies and coordinated by DIT.
- The studied network consist primarily of 9.6 KB and 56 KB circuits, supplemented by T1 for certain links.
- The network is viewed as providing a utilitarian service to all agencies.
- Information from various agencies has been aggregated and comparisons have been performed for the hierarchical and multiprotocol networks against selected peer groups.

### 3.1.5.2. Hierarchical

We begin our discussion with a presentation of the hierarchical network benchmark results.

### 3.1.5.3. NOW Index Calculation

The first table we will examine for the hierarchical network is the NOW Index calculation. This will provide an overall view of the hierarchical network's efficiency as operated by DIT. The abbreviation VA-HIER represents the CTN's hierarchical component. This calculation is performed first by multiplying the actual quantities of workload factors by the standard unit cost. This standard being derived from the Real Decisions benchmark. This value then divides the actual costs to arrive at the NOW Index.

**Table 8. NOW Index Calculation**

Workload Driver	Annual Workload	Standard Unit Value	Workload Value
Traffic (GBs)	2,586	\$265.30	\$685,986
Sites	943	\$6,764.43	\$6,378,861
Devices	34,563	\$100.50	\$3,473,499
			<b>\$10,538,345</b>
		COMMVA-HIER Workload Value	<b>\$5,658,339</b>
			<b>\$10,538,345</b>
		NOWIndex	<b>0.54</b>

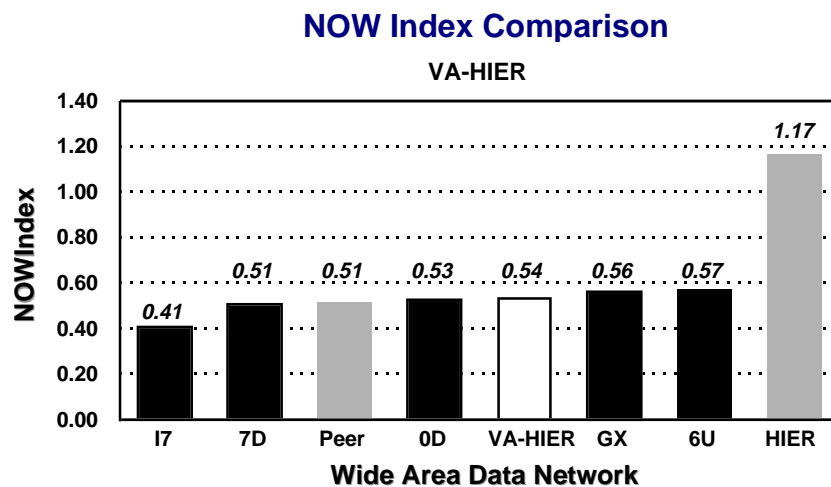
Source: Real Decisions



The Now Index is calculated as .54, representing a significant level of efficiency. The Commonwealth of Virginia, specifically DIT, has created an excellent IBM SNA network. As such, this network shares many of the same attributes as does the other governmental organizations that we have benchmarked.

#### 3.1.5.4. NOW Index Against Government Peer Group

Figure 20 below, depicts the CTN—hierarchical against a peer group. The peer group represents a set of comparable governmental networks. As with other benchmarks, each entity is represented by a double letter abbreviation. Four of the five peer group members are state governments, and the remaining one is a technology company. All of them conduct their business within a state and are transitioning from hierarchical environment to an MPN infrastructure. This is the case with the Commonwealth.



Source: Real Decisions

Figure 20. NOW Index Against Government Peer Group

As the graph demonstrates, the DIT-hierarchical network has a slightly higher NOW Index, and hence slightly lower efficiency, than the mean of this group. But, compared to the average across the entire database, depicted by VA-HIER, the Commonwealth's hierarchical network is very efficient.

#### 3.1.5.5. Work Value Produced Against Government Peer Group

The table below, depicts the value of the work produced against the standard peer value. The standard peer value is calculated from the Real Decisions database and represents the "normal" or average cost per unit of work produced by the peer group in the three categories.

The first category/workload driver represents the traffic passed, in total, throughout the network. The second workload driver—sites—represents personnel and other assets and the value derived in terms of production at each location. The last workload driver





represents the devices and the work produced by them.

**Table 9. Work Value Against Government Peer Group**

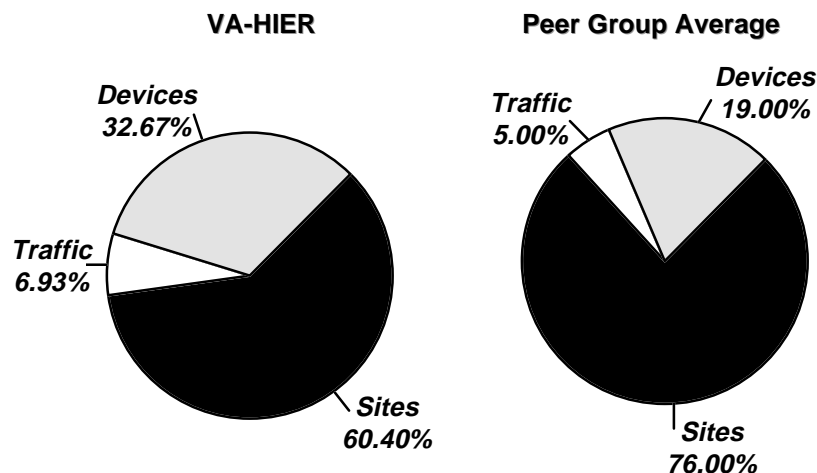
Workload Driver	Annual VA-HIER Workload	Peer Standard Unit Value	Peer Value
Traffic (GBs)	2,586	\$136.41	\$352,704
Sites	943	\$3,477.97	\$3,279,730
Devices	34,563	\$51.67	\$1,785,920
			<b>\$5,418,354</b>
	VA-HIER	Peer	Difference
Cost to Produce	\$5,658,339	\$5,418,354	4.43%

Source: Real Decisions

This table above demonstrates a slightly higher level of cost to produce value than the peer group, representing a slightly lower level of productivity. This fact was represented in the NOW Index presented previously in section 3.1.5.3.

### 3.1.5.6. Distribution of Workload Value

Figure 21 below, depicts the distribution of workload value, as a percentage of the total, across the three workload driver categories listed above. This figure illustrates the relative distribution of the workload for the CTN-hierarchical as compared to the peer group average. The purpose of this figure is to understand the relative costs produced by the workload drivers in an attempt to illustrate variance and causes.



Source: Real Decisions

**Figure 21. Distribution of Workload Value**



Our comparison demonstrates higher relative costs for both the devices and the traffic, while the sites are less expensive. This is exemplary of the higher number of devices per site at the Commonwealth than with our peer group. It should be noted that these types of factors tend to be driven more by the structure of the business as compared to the actual management of the network.

### **3.1.5.7. Cost Comparison Against Government Peer Group**

This next table demonstrates the costs associated with the Commonwealth Hierarchical network, and compares this to the government peer group. The four categories are hardware, software, personnel and transmission. The peer group again is the average of the groups selected as peer.

**Table 10. Cost Comparison (000s)**

Cost Category	VA-HIER	Peer Group	Difference
Hardware	\$1,364	\$1,021	\$343
Software	\$567	\$624	-\$57
Personnel	\$2,430	\$941	\$1,489
Transmission	\$1,297	\$2,833	-\$1,535
	\$5,658	\$5,418	\$240

Source: Real Decisions

The hardware and personnel costs are higher than the peer group, the hardware by a substantial margin and the personnel by a very substantial margin. The personnel area represents a potential area for improvement. The software costs are slightly less expensive and the transmission costs much less expensive. The transmission costs are indicative of the cost allocation between the hierarchical and multiprotocol network as well as a well structured contract.

### **3.1.5.8. Headcount Against Government Peer Group**

Seeking to understand the personnel cost issue in more detail, we present the following table. This table examines headcount in several categories against the government peer group.



**Table 11. Headcount Against Government Peer Group**

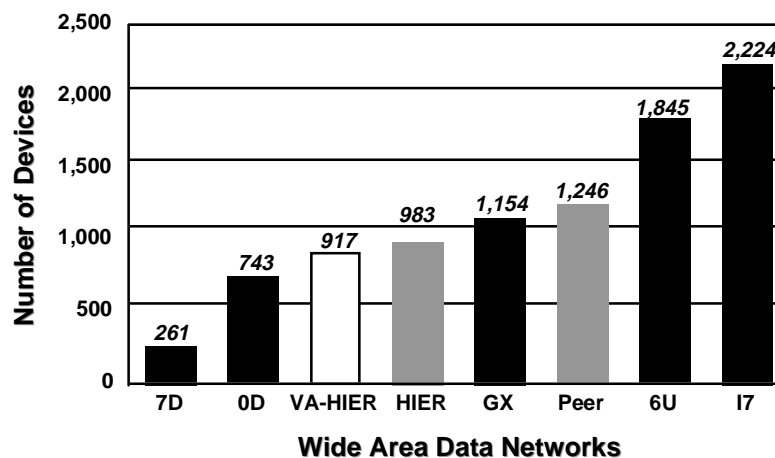
Category	VA-HIER	Peer Group	Difference
Management & Administration	9.93	2.58	7.35
Planning	6.52	1.53	4.99
Systems	3.51	1.33	2.18
Change Management	5.15	2.65	2.50
Operations & Hotline	12.60	7.96	4.64
Total	37.71	16.05	21.66
Annual Cost	\$2,430,000	\$941,379	\$1,488,621
Cost/Person	\$64,439	\$58,661	\$5,778

Source: Real Decisions

This table demonstrates several interesting items. First, all categories represent a higher headcount than the peer group; there is an opportunity to reduce headcount across the board in the WAN arena. Second, the two least operationally focused categories, management/administration and planning have significantly higher headcount than our peers. Management/administration is almost three times higher, in headcount, than the peer group. The planning area is over three times higher. Lastly, the cost per person, higher by \$5,778 presents a cost level 10 percent higher. In short, we believe that the personnel area represents a significant opportunity for improvement.

#### **3.1.5.9. Devices per Network Personnel**

This figure demonstrates the devices per network personnel and represents, to a degree, overall network productivity.



Source: Real Decisions

**Figure 22. Devices per Network Personnel**



Figure 22 above depicts a lower overall productivity at the Commonwealth as compared to the peer group. This figure again demonstrates the theme demonstrated via the benchmark and the data collection efforts, that the number of professionals managing the network can be reduced while maintaining the same level of output.

### 3.1.5.10. Multiprotocol Network

#### 3.1.5.10.1.NOW Index Calculation

The first table we will examine for the multiprotocol network is the NOW Index calculation. This provides an overall view of the multiprotocol network's efficiency. The abbreviation VA-MPN represents the CTN's multiprotocol component. The table below first calculates the workload value produced. This calculation is performed first by multiplying the actual quantities of workload factors by the standard unit cost. This standard is being derived from Gartner Group's Real Decisions benchmark. This value then divides the actual costs to arrive at the NOW Index.

**Table 12. NOW Index Calculation**

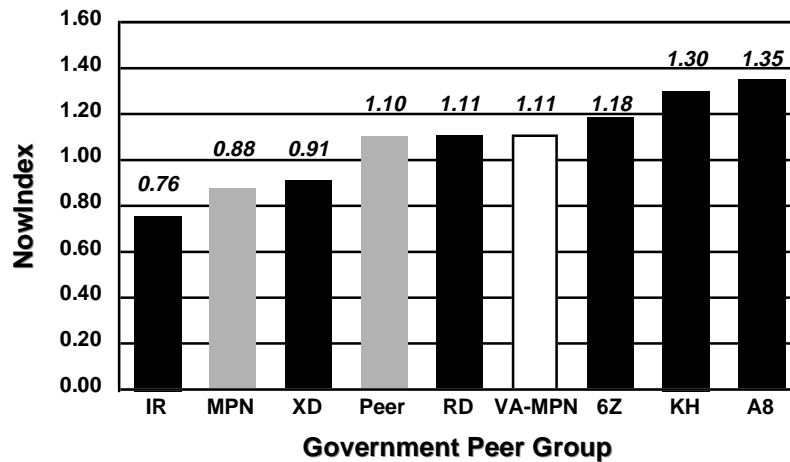
Workload Driver	Annual Workload	Database Standard Unit Value	Workload Value
Traffic (GBs)	3,362	\$265.30	\$892,056
Sites	192	\$6,764.43	\$1,298,771
Devices	15,712	\$100.50	\$1,579,018
			\$3,769,846
		VA-MPN Cost	\$4,186,892
		Workload Value	\$3,769,846
		NOWIndex	1.11

Source: Real Decisions

The Now Index is calculated as 1.11, representing a less than ideal degree of efficiency.

#### 3.1.5.10.2.NOW Index Against Government Peer Group

Figure 23 depicts the Commonwealth multiprotocol network and compares it against the peer group. The peer group represents six companies which operate comparative statewide data networks. Most of them are in the technology and utility industries. One member of the peer group is a state government (this peer group is different from the one used for the hierarchical network).



Source: Real Decisions

Figure 23. NOW Index Against Government Peer Group

As the graph demonstrates, the DIT-multiprotocol network has a higher NOW Index, and hence lower efficiency, than the mean of the group sampled, but not by a wide margin. Comparing these two values to the average for the entire database of .88, we see that the entire peer group has opportunities for improved network management. This is further reflective of the greater maturity of the multiprotocol network in the private sector as opposed to the public sector. This figure demonstrates that there are opportunities for improvement within the multiprotocol network.

### 3.1.5.10.3. Work Value Produced Against Government Peer Group

The table below depicts the value of the work produced against the standard peer value. The standard peer value is calculated from the Real Decisions database and represents the “normal” or average cost per unit of work produced in the three categories.

The first category/workload driver represents the traffic passed, in total, throughout the network. The second workload driver—sites—represents personnel and other assets and the value derived in terms of production at each location. The last workload driver represents the devices and the work produced by them.



**Table 13. Work Value Against Government Peer Group**

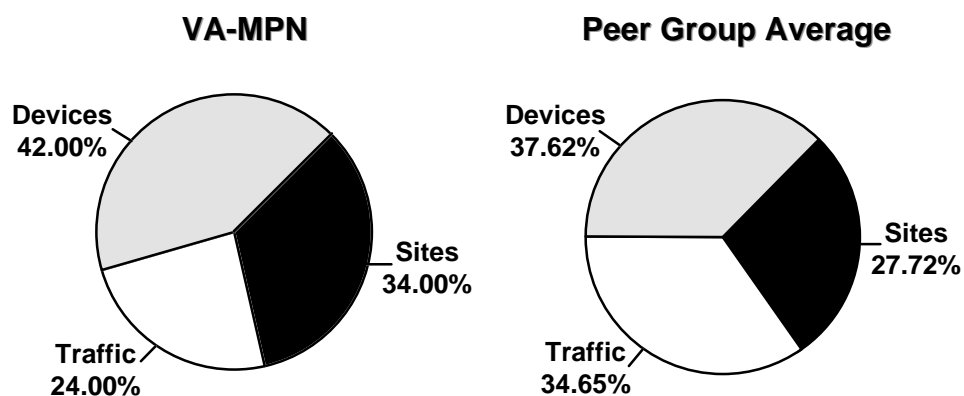
Workload Driver	VA-MPN Standard	Standard Unit Value	Peer Value
Traffic (GBs)	3,362	\$292.34	\$982,985
Sites	192	\$7,453.94	\$1,431,157
Devices	15,712	\$110.74	\$1,739,970
			\$4,154,111
			Difference
Cost to Produce	\$4,186,892	\$4,154,111	0.79%

Source: Real Decisions

This table demonstrates a slightly higher cost attributable to the multiprotocol network as developed and operated by the Commonwealth; the figure is not considered significant however.

#### 3.1.5.10.4.Distribution of Workload Value

Figure 24 depicts the distribution of workload value, as a percentage of the total, across the three workload driver categories listed above. This figure illustrates the relative distribution of the Commonwealth as compared to the peer group average. Our purpose with this figure is to understand the relative costs produced by the workload drivers in an attempt to illustrate variance and causes.



Source: Real Decisions

**Figure 24. Distribution of Workload Value**



As with the hierarchical network, we again recognize a higher number of devices and sites at the Commonwealth than with the peers.

#### 3.1.5.10.5. Cost Comparison Against Government Peer Group

This next table demonstrates the cost of the Commonwealth multiprotocol network against the government peer group. The four categories we examine are hardware, software, personnel and transmission.

**Table 14. Cost Comparison (000s)**

Cost Category	VA-MPN	Peer Group	Difference
Hardware	\$780	\$693	\$86
Software	\$367	\$125	\$243
Personnel	\$1,430	\$1,569	-\$138
Transmission	\$1,610	\$1,767	-\$158
	\$4,187	\$4,154	\$33

Source: Real Decisions

The multiprotocol network provided by the Commonwealth is very similar, in cost structure, to the cost structure in our peer group (the allocation of headcount and costs between the two networks might affect this).

#### 3.1.5.10.6. Headcount Against Government Peer Group

Seeking to understand the personnel costs issue in more detail, we present the following figure. This figure examines headcount in several categories against the government peer group.

**Table 15. Headcount Against Government Peer Group**

Category	VA-MPN	Peer Group	Difference
Management & Administration	6.72	3.09	3.63
Planning	3.35	3.72	-0.37
Systems	1.21	2.01	-0.80
Change Management	6.07	3.80	2.27
Operations & Hotline	5.06	8.19	-3.13
Total	22.41	20.81	1.60
Annual Cost	\$1,430,250	\$1,568,696	-\$138,446
Cost/Person	\$63,822	\$75,390	-\$11,569

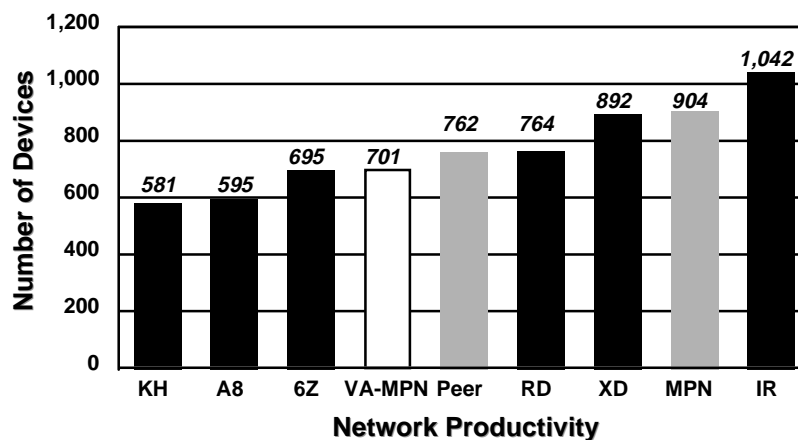
Source: Real Decisions



The table above demonstrates several interesting points. First, the headcount associated with the management and administration is twice the norm. This repeats a theme first illustrated with the hierarchical network. Second, change management is significantly higher than the peer group. Lastly, the cost per person, is \$11,569 lower than the peer group.

### 3.1.5.10.7.Devices per Network Personnel

Figure 25 below demonstrates the devices per network personnel and represents, to a degree, overall network productivity.



Source: Real Decisions

Figure 25. Devices per Network Personnel

This figure depicts a higher overall productivity at the Commonwealth as compared to the peer group.

### 3.1.5.10.8.Overall WAN Conclusions

**Recommendation (G12).** *This section represents Gartner Group's recommendations to the Legislature and the various technology groups regarding the WAN. The Commonwealth has been implementing a multi/TCP-IP protocol network for the past several years. At the present time, the hierarchical network performs much better than the multiprotocol counterpart on a unit cost basis. Although some of the agencies are planning to migrate their hierarchical networks to the multiprotocol environment, there are no formal strategies in place and no coordinated effort has been planned to effect this change. Further, other state agencies are seeking to develop WAN capability by developing their own network. A strategy to address this issues might be developed as follows:*

- *Develop a comprehensive migration strategy covering all state agencies.*





- *As new applications are developed, they should be designed for the MPN where feasible.*
- *The impact of future MPN expansion should be assessed and monitored with prudence.*
- *Consolidate systems service requirements to provide consistent service levels and define services to be offered.*
- *Develop resource management plans to provide adequate systems and staffing to support developing applications.*

*Other factors which might improve the overall operation of both networks include:*

- *A centralized network organization such as DIT should be given the responsibility for overall planning, design and resource control.*
- *Systems for measuring and monitoring network activity should be implemented in all agencies.*
- *The distribution of transmission costs between the hierarchical and multiprotocol networks needs to be reviewed to understand the costs and how to impact them.*

*Perhaps the best recommendation to be made regarding the WAN is the designation of the Department of Technology Services (DTS) (this entity is described later in the report) as the only provider of wide area communications.*

### **3.1.6. Client/Server vs. Mainframes: an "OR" or an "AND"?**

With the introduction of the client/server technology across the Commonwealth (and the introduction of the client/server operations group discussed later) we believe it is appropriate to provide insight into its proper role in State government. Gartner Group research shows that more than half of the organizations using mainframes will also use them to participate in client/server strategies through the five-year planning horizon.

Gartner Group continues to receive inquiries from clients mysteriously compelled to "get off" the mainframe and "get on" to client/server as quickly as possible. They are convinced that the mainframe is dead, and only the burial remains. Some feel they face only an either/or choice. Many organizations, however, are implementing strategies that embrace both the client/server and mainframe models.

Unfortunately, this is not the first time the media has hyped new technology and proclaimed a rapid end to the status quo. Technology zealots have consistently underestimated the maturity of new technologies and overestimated their rate of absorption into core business processes. Remember the first year the terms relational databases, object-oriented technology, Integrated Services Digital Network and image



processing were mentioned? Most are just now achieving general acceptance. The PC (15 years old) is just now being fully exploited in core business processes. Client/server has suffered a similar fate and the Internet appears headed down the same path.

Processing on mainframes is not dead, nor is client/server a panacea for defective business processes. For the next 10 to 15 years, the two will coexist and complement each other in large mission-critical applications. Is this just the opinion of more zealots trying to establish contrary positions? Perhaps, but to pursue the argument, we reviewed a number of Gartner Group surveys from symposiums, conferences and ongoing research efforts. The results are sobering to client/server zealots. As part of a recent research effort, we asked clients to describe their use of client/server for new applications development. An overwhelming 81 percent said they had deployed or were piloting client/server systems. Two-thirds had offloaded mainframe applications, and the number would approach 80 percent in 1996; not a good omen for client/server thus far.

When asked how much offload was taking place, however, a different picture emerged. Actual offload in 1995 was only five percent and projections are usually overestimated. From conference surveys, we found that fewer than five percent of respondents expected to totally offload their mainframes in the next two years. Installed mainframe MIPs and DASD actually grew over the past several years, and this growth is expected to continue for several more. Client/server is a dominant computing model and will dominate IT investments, but only 16 percent of production applications have been moved to client/server thus far. The number will rise to only one-third in the next two years. While most new applications being developed are for the client/server architecture (55 percent) the remainder are not. For most enterprises, the two computing models will coexist for some time.

Data from another research effort conducted by Gartner Group indicated that, while some applications development is migrating to end-user departments, the majority will remain with the central IT organization. Mainframes hold a definite place both as development and deployment platforms with central organizations. In a survey of deployed client/server projects, mainframes were a significant part of client/server implementations, usually as one server in a server hierarchy, and were present in more than half of large projects (more than 5,000 workstations).

Several factors influence mainframe longevity. The cost, complexity and management issues of large client/server projects have been underestimated, resulting in a slower adoption rate for "enterprise class" client/server systems. As recently as 1995, it was "politically incorrect" for IT organizations to ask for mainframe technology investments. The resulting pent-up demand has fueled mainframe MIPs growth. The recent availability of CMOS technology also makes mainframes more competitive, not only for new MIPs, but also to replace existing inventory. Yet, another critical issue in client/server migration is the availability of skills and resources to do the job. Client/server skills are scarce and expensive, causing new applications to leverage existing skills and investments wherever possible. A final factor, often overlooked by



technologists, is business risk. Few companies are willing to risk their business processes, perhaps even their companies' future, on new technologies, no matter how promising they may appear. Most are adopting a much slower, cautious pace.

### **3.1.7. Inadequate Central Support for Client/Server Systems**

#### **3.1.7.1. Cost Efficiencies from Centralized Approach**

The IHRIS and ADAPT projects represent an excellent paradigm for processing at the Commonwealth in the future. The IHRIS project makes use of modern IT componentry, including a Unix processor and a relational database. Further, the application is sponsored by an agency for use Commonwealthwide. The system is to be operated by DIT, as are the two mainframe processors now. Hence, from a business, technology and organizational perspective, this paradigm represents an excellent approach to computing.

***Recommendation (G13). The Virginia General may wish to create a client/server operations group within the State data center for the purpose of providing centralized client/server information technology services to State agencies.***

Gartner Group expects that Unix would be the primary processing platform for the first period of time that this operation is in existence. We are concerned about the adoption of other platforms, as this leads to the types of issues which are prevalent now. However, many agencies would prefer the economies of scale associated with such an operation, and would enjoy a cost savings.

#### **3.1.7.2. Should Client/Server Commonwealthwide Systems be Considered?**

This question deals with inter-agency client/server applications. If the answer to this question is no, the Commonwealth may be missing out on the client/server revolution—but the real question is: Just what would the Commonwealth be missing? First, the Commonwealth would be missing out on the ability to install new databases, architectures and applications that are often much more flexible and maintainable. However, the Commonwealth would also be "missing out" on applications that typically cannot scale beyond 1,000 concurrent users, might have less than the functionality of most legacy applications, particularly in the connectivity area (the PeopleSoft implementation represents additional functionality over what exists today), and that are often installed by systems integrators with an immature set of technological and functional skills.

Still, valid reasons exist to install packaged enterprise client/server systems today, and if they are compelling enough, such solutions should be implemented. For example, the Commonwealth must comply with year 2000 requirements, forcing the restructuring of applications. Old and brittle technology exists which is on the brink of failure. The post-WTA Commonwealth may want to minimize costs or want to find new applications that offer a high return on investment (ROI) or increased functionality. Research shows that



enterprises that have focused on these reasons and have built a business case and then managed the installation properly have reported tremendous business gains. However, fewer than 20 percent of enterprises have attained this.

On the other hand, valid reasons exist not to install an enterprise application. First, if no business reason exists to change technologies, do not do it. More than 70 percent of enterprises that exchange their 1980s-era, host-based general-ledger system for a 1990s-version client/server system without the required BRP will likely suffer a negative ROI. This seems like common sense, but common sense is often blurred by the hype surrounding popular technologies (e.g., the Internet). Another reason not to install client/server is that the market simply cannot support every enterprise's desire to move toward the technology. Secure and robust network communications and implementation assistance are becoming scarce worldwide.

### **3.1.8. Potential Changes in the Telecommunications Area**

#### ***3.1.8.1. State Agencies Should Not Pay for Billing Reconciliation***

Currently, DIT is responsible for the billing of voice telecommunications services for all State agencies. DIT is billed for the aggregate of all telecommunications services provided by vendors to State agencies. DIT in turn uses data provided by the vendors with their billings to bill the individual agencies. The purpose of this process is to permit DIT to reconcile billings against contractual rates for services and to verify the accuracy of the services billed. The process captures and corrects billings in error because the vendors have not properly accounted for changes to service or have improperly applied the contract rates for service.

This process has apparently more than justified its use (from a cost perspective) by capturing significant over-billings made by vendors. In FY 1997, for example, DIT reports that it corrected errors in excess of \$1.76 million, at a cost to the State of \$158,340. Currently, these costs are borne by DIT customer agencies. The reconciliation process has worked well because DIT is familiar with the contract rates and has been responsible for the coordination of the changes to services used by State agencies.

While the billing reconciliation process used by DIT has been successful in correcting errors, it also points to excessive billing errors by the major telecommunications carriers. It is the view of Gartner Group that the amount of billing errors should be considered unacceptable by the Commonwealth. It should be the responsibility of the vendors to correctly bill for telecommunications services, and the State should not have to bear the financial burden of correcting any errors.

Gartner Group believes that the Commonwealth should include in its contracts with telecommunications vendors a standard for an acceptable level of errors, and a provision for the recovery from vendors of any costs the State incurs to correct billings



in excess of the standard. The State may also want to consider the assessment of penalties for vendors which show no improvement in billing accuracy over time. The goal should be to reduce the level of billing errors, and to reduce the costs associated with the current billing reconciliation process. In any event, the costs of billing reconciliation should not be charged to the customer agencies but should be recovered from vendors.

***Recommendation (G14). The Department of Information Technology should include provisions in all telecommunications contracts to establish acceptable levels of billing errors from vendors and require reimbursement from vendors for any costs incurred by the State to correct errors in excess of the standard. As vendors are brought into compliance with reasonable standards for billing accuracy, the billing reconciliation process could be converted to an audit on a periodic basis.***

### **3.1.8.2. The ATM Network**

Throughout this study, the Gartner Group and JLARC held several discussions regarding the ATM Network. It was apparent to the project team that this ATM network was both new and possibly of benefit to the Commonwealth; as such, some follow-up data collection was performed after the core period to better understand the network and its role in the Commonwealth. The network has been named NET.WORK.VIRGINIA by its creators.

NET.WORK.VIRGINIA is a broadband network delivering ATM service statewide. It is the result of a project led by Virginia Tech in association with Old Dominion University and the Virginia Community College System to develop universal access to advanced digital communications services for all of Virginia.

There are currently 120 participating sites all connected. Participants include four year colleges and universities, the Virginia Community College System, private schools, and several K-12 school systems. Also, many state agencies are taking advantage of NET.WORK.VIRGINIA including the Department of Health, the Virginia Employment Commission, the Department of General Services, the Virginia State Library, the State Police, the Institute of Marine Science and others. An Internet gateway is included which is open to all participants. A single connection to NET.WORK.VIRGINIA can be used to support different types of multimedia connections simultaneously. The bandwidth can be flexibly allocated and reallocated as needed. As of the time of this draft, efforts were underway to provide lower speed access which would be more economical.

Two major carriers are used to provide this network. They are Bell Atlantic which is the prime contractor representing every LEC (including themselves) in Virginia. This contract addresses the local access and intraLATA switching services. Sprint provides the interLATA ATM backbone and the ATM Internet gateway. The contract is currently



established to support an organization or political subdivision within the Commonwealth as defined by Code of Virginia, 8.01-385(3)iii.

Organizations wishing to participate can download an order form from the Internet, complete the forms, and send them to the three alliance members (Sprint, Bell Atlantic and Virginia Tech). Funding for this effort is direct from the costs incurred; no State funds are used to finance the network.

From a technical perspective, Gartner Group believes that the ATM network, such as the one developed via this effort, represents an excellent vehicle for wide area data communications. The ATM technology provides for various bandwidth connections, is flexible and generally cost effective.

### **3.1.8.3. Network Consolidation**

As mentioned elsewhere in this report, there are several network entities/initiatives which exist within the Commonwealth. The largest and most well known is the Commonwealth Telecommunications Network (CTN). This network was developed and is maintained by DIT. The CTN provides both Frame Relay Services and SNA connectivity amongst the various physical state locations. The CTN is used by the legislative, judicial and executive branches of state government.

The discussion immediately above dealt with the NET.WORK.VIRGINIA, otherwise known as the ATM network.

A downtown Richmond metropolitan area network (MAN) has also been developed. This network was designed and installed by the DGS with the view that this network is a real estate/lease service. DGS utilized right-of-ways located throughout downtown Richmond to lay fiber and communications hardware. Essentially, DGS circumvents any public carrier, providing very low cost data connectivity.

***Recommendation (G15). The Virginia General Assembly may wish to direct the consolidation of the administration of the Commonwealth Telecommunications Network, Net.Work.Virginia, and the Metropolitan Area Network under a central network support organization. Wide area network research for State government should be established as the responsibility of the Commonwealth's research universities. Individual agencies should be prohibited from developing independent wide area networks.***

### **3.1.9. Proper Planning for IT**

The IT infrastructure required for the new network-centric and client/server computing model is becoming increasingly massive and is commanding a larger share of total IT spending within a given enterprise. The nature of the demands also is changing, based on broader, more-ubiquitous services to the desktop and to shared information access in rapidly changing times. Thus, the foundation of the IT domain or infrastructure must



get a major share of attention and planning, unlike in the past. Many of the recommendations made via this report speak indirectly to this issue.

Strategic planning for IT has typically consisted of a series of development projects ranked in order of priority. This is no longer a useful approach for several reasons. The requested list often was much too long, and tackling it in a reasonable amount of time was far beyond the capacity of the IT organization. The power of IT was to determine the user's position in the queue, which is no longer tenable since power is shifting to the user organization. Because of this situation, most user requests were viewed in terms of immediate needs, and little vision was generated for longer-term investments. In addition, after a project was completed, the nature of the new requirements often changed, making the prior definition of ranked projects useless.

Two levels of strategic planning are now needed. The first is at the agency unit level and involves getting the best possible use of applied IT to achieve the agency's objectives. This alignment of IT with Commonwealth objectives should be high on the list of concerns of senior centralized IT operation management. Improving the partnership and planning process between the centralized IT organization and the agencies is the area undergoing the greatest change. The second level of planning involves the IT infrastructure, which is independent of the specific Commonwealth applications. As the specific applications are being driven by the agencies, the centralized IT organization must make the infrastructure well-suited to the application tasks.

Many progressive organizations are focusing new attention on infrastructure in an effort to balance long-term needs with the desire for responsiveness and initiative. The responsiveness must be tailored to the business strategy and dynamics, but the long-term needs must be planned to build the proper foundation for the future. There are two issues to address: the nature of what can be done via infrastructure strategy, and the determination of what infrastructure characteristics are most important. Regarding infrastructure strategy, a progressive organization divides its attention among three areas—technology platforms, management processes, and people and skills. For each area, the organization carries out a classical strategic-planning approach—determining where one wants to be, evaluating where one is, and determining the gap that needs to be filled. This report essentially performs that for the Commonwealth by laying out a number of recommendations.

Based on the available resources, the organization then lays out a series of steps or projects to be implemented, or a strategy of how to reach its objective. One key is to treat and focus on each area separately. If the management processes include funding decisions, there should be a defined way to gain approval for spending—both for the new business applications requested (often solely in the hands of business units) and for the infrastructure, recognizing that it is more difficult to gain investment support for infrastructure. A well-prepared plan for skills growth is equally important to suit the newly emerging requirements for the Internet, Java, or whatever represents important



new needs to be addressed.

The only reason or justification for an infrastructure is to provide a platform for applications. Hence, to obtain the economic support for infrastructure, one needs to specify the essential applications that will drive it. There are many such projects within the Commonwealth today. The infrastructure funding often is accomplished in anticipation of major applications. Furthermore, the character of the business requirements and the nature of the applications must be understood to justify the infrastructure strategy.

The second issue, which involves what style of infrastructure is required, is equally important. For a firm that is in a stable industry, such as agriculture, superior performance means operational excellence and minimal cost, and probably not the rapid creation of new products or business processes. Instead of major changes and process redesign, the focus is on continuous improvement—maintaining high reliability, but constantly pushing for small enhancements. The IT infrastructure must accommodate the lowest-cost platforms (e.g., via open systems and Unix), flexibility for constant change without disruption and, depending on the character of the organization, the capability of running very small- to very large-scale operations, plus the accommodation of local priority setting by the geographically distributed, relatively autonomous business units.

**Infrastructure Trade-Offs.** A balance must be determined between a consistent, highly efficient foundation for applications and the ability to support a wide variety of applications or purchased packages. Since doing both is impractical, a process for making the necessary decisions must be in place. A steering committee or “office of IT” is the normal decision-making body for this matter in a generic sense. For the Commonwealth, it would be the Technology Services Council (TSC), comprised of selected managers of the IT groups within the agencies as we recommend later in this report. Current thinking is that more attention is being placed on infrastructure that would achieve a higher degree of flexibility and responsiveness at the expense of some operating efficiency or total life cycle cost.

### **3.1.10.Voice Information Processing Benchmark Results**

In this section, we provide a review of the Voice Information Processing benchmark, performed on the voice network at the Commonwealth as provided by the DIT.

We begin with some statistics: the voice network is characterized by approximately 140 million minutes of voice traffic; services are provided by both MCI and Bell Atlantic. The total expenditure of the voice network/environment is approximately \$12.9 million. A small amount of traffic is carried by other local exchange carriers and was not included in this study.





### 3.1.10.1. Study Parameters

We begin our overview of the voice network benchmark with the presentation of the study parameters.

**Table 16. Voice Network Benchmark Study Parameters**

	Annual Call Minutes (000's)	Consensus Budget (000's)	Personnel
VA	141,873	\$12,945	20.87
PEER	119,876	\$12,271	3.21
VRT (Average)	83,247	\$8,596	2.67

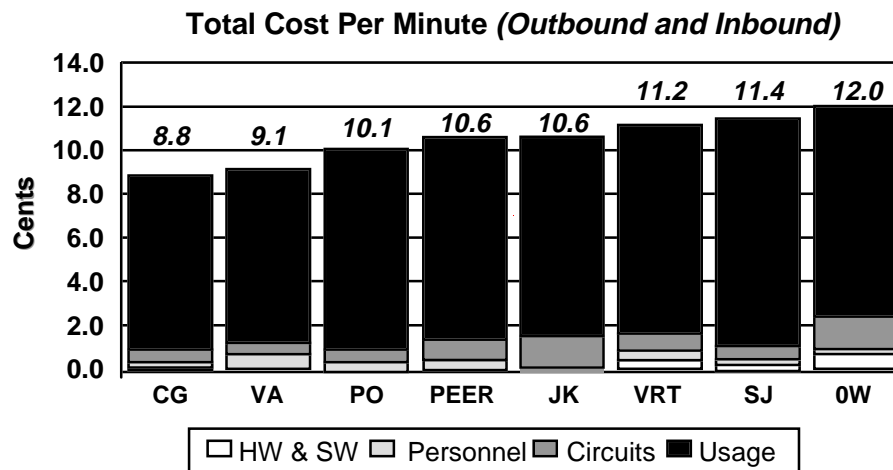
Source: Real Decisions

The peer group was chosen for this benchmark based upon two criteria. First, we chose organizations that had a similar virtual network; the network as currently configured at the Commonwealth is a virtual network managed by the two service providers. Second, we chose peer groups which had a similar number of call minutes.

A review of this information points to the fact that there is high headcount associated with the management and operations of the voice network. As with other benchmark result presentations elsewhere in this report, we compare the Commonwealth to a peer group—PEER and to the average in the database—VRT.

### 3.1.10.2. Total Cost per Minute

The figure below, examines the cost per minute of both inbound and outbound calls, and examines the network costs only. We will examine the technology costs later in this section.



Source: Real Decisions

**Figure 26. Total Cost per Minute**

In Figure 26 above, we recognize the Commonwealth as having low cost transmission. This is a result of the contracts negotiated with the two providers. Only one of the organizations in Gartner Group's database has a lower cost per minute figure than the Commonwealth's. The personnel costs, however, are much higher at DIT than with the other organizations surveyed.

### **3.1.10.3. Virtual Usage Cost per Minute**

The following table examines the cost per minute of five categories of calls. These categories are defined as follows:

- "A" Rate/On-On—represents calls made completely within the virtual network.
- "B" Rate/On-Off or Off-On—represents calls made from the network out to non-network locations or from non-network location onto the network.
- "C" Rate/Off-Off—represents calls made off network to off network.
- 800 Dedicated—represents 800 calls inbound via dedicated circuits (calls originating within the network).
- 800 Switched—represents 800 calls made via switched circuits.



**Table 17. Virtual Usage per Minute**

	"A" Rate On-On	"B" Rate On-Off	"C" Rate Off-Off	800- Dedicated	800- Switched
VA	\$0.040	\$0.068	\$0.105	\$0.079	\$0.108
Peer	\$0.055	\$0.088	\$0.123	\$0.094	\$0.139
JK	\$0.052	\$0.075	\$0.109	\$0.096	\$0.141
OW	\$0.055	\$0.098	\$0.115	\$0.103	\$0.166
SJ	\$0.064	\$0.095	\$0.129	\$0.099	\$0.135
CG	\$0.040	\$0.078	\$0.145	\$0.083	\$0.114
PO	\$0.062	\$0.093	\$0.116	\$0.088	\$0.137

Source: Real Decisions

The Commonwealth has achieved virtual usage rates which are in the top 10 percent of the database for outbound A, B and C rates as well as the two inbound 800 calling categories.

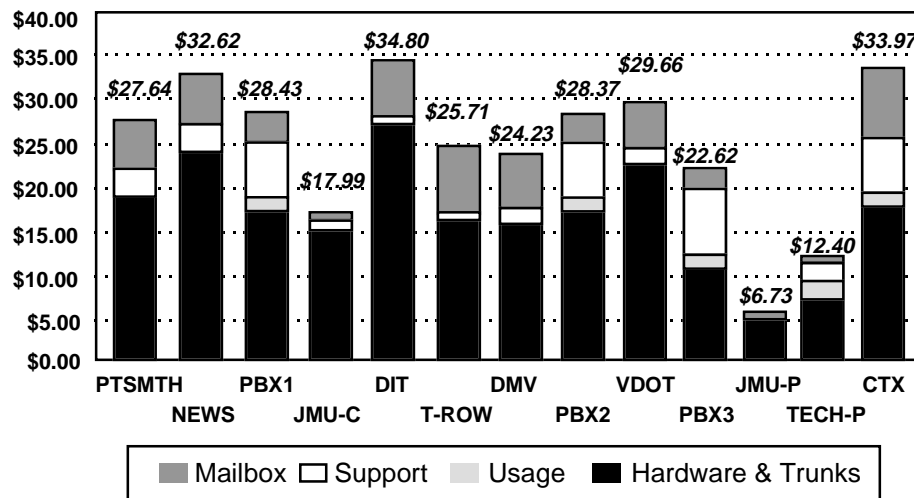
#### **3.1.10.4. Monthly Cost per Extension**

This section focuses on the analysis of the technology used to provide the voice communications. It includes the hardware, software and personnel used to support and operate the physical locations associated with the voice network. More specifically, it includes items such as handsets, voice mail, voice response, facsimile, planning, etc.

Gartner Group's peer group selection was slightly different for this component of the benchmark. We created four peer groups based upon type of technology (Centrex vs. PBX), site size, level of control and MAC activity. Gartner Group utilized four comparison groups as follows:

- PBX1—less than 1,000 extensions
- PBX2—1,000 to 4,000 extensions
- PBX3—more than 4,000 extensions
- CTX—Centrex using organizations.

Figure 27 below outlines the costs per extension at the agencies surveyed, and includes hardware/trunks, usage, support and the mailbox.



Source: Real Decisions

Figure 27. Monthly Cost per Extension

Both James Madison University and Virginia Tech have integrated voice mail which operates at a cost significantly below other voice mail systems used in state agencies.

### 3.1.10.5. Voice Benchmark Conclusions

Several interesting conclusions can be drawn from a review of the benchmark data:

- The Commonwealth's overall network cost is 15 percent below the peer group.
- The Commonwealth is managing the network with a staff six to seven times that of the database average (section 3.1.9.1).
- With respect to the technology side of the benchmark, the Centrex costs per extension is less than the database average, this is inclusive and exclusive of voice mail costs.
- Both of the PBX environments examined exhibited cost structures that were considerably less than the comparable averages in our database.
- While the rate of change figures were not presented in this summary (see appendix for more detail on all the benchmarks), the rate of change experienced is one-half that of the database (excludes James Madison University).
- The cost per software change is reasonably consistent from site to site, but the hardware costs vary extensively.

### 3.1.11. Managing Package Application Implementation

More and more, Commonwealth agencies are implementing packaged applications as an alternative to completely new development. Critical to the success is a well designed implementation program. In an effort to ensure successful implementation of packaged applications, we recommend building an implementation plan that follows the 13 steps described below.



1. Building the Implementation Team—identify the right mix of end users and technical representatives for the implementation team (this will include DIT and agency personnel), and get managers' commitments for these people to be assigned full-time to the project team. Establish rules of engagement for issue tracking and resolution, milestone analysis, scope changes and ongoing institution wide communications about the project. If a systems integrator will be involved, select one during this step, and sign a contract commensurate with the procurement policies of the Commonwealth. The time this step takes is directly proportional to the institution's size and the number of business units involved in the implementation.
2. Envision the New Culture—envision the new culture, processes and structure of the business functions to be changed. Define an overall technological framework under which the new applications will be implemented. These definitions will help the agencies involved to develop an effective RFP and draft scripted scenarios against which competing software can be measured. This also serves as the destination map on which the project should focus, and it should become the basis for justifying the replacement system's cost.
3. Evaluating Vendors—develop a short list of software vendors by reviewing vendor RFP responses and product demonstrations, checking references, running benchmarks and negotiating a contract. Conduct a gap analysis, which will identify the difference between desired functionality and what the vendor can deliver. Make firm decisions as to whether custom modifications will be made or whether niche third-party applications will be used to fill the gaps. Should the Commonwealth render many changes to the packaged application, future modifications to new releases of the packaged applications will be required.
4. Setting Up and Maintaining the Technology Infrastructure—assess and acquire the hardware needed to support the expected volume of users and transactions. This step includes a review of the capability at the new DTS in terms of systems resources needed. Install the database, system software and "vanilla" applications, and run test streams to certify the installation. Optimize test machines regularly, synchronize multiple application servers and client machines and outline a disaster recovery plan. Here and throughout the implementation, correct and transport parameters across test, training and production environments. In many institutions, application implementations provide the first exposure to Unix, relational databases and networks, so allocate the funds needed to climb these learning curves, if appropriate.
5. Implementing the Pilot—many institutions implement pilots (generally at selected business units or processes) and then leverage the lessons learned and, ideally, the data tables in follow-on implementations. Gartner Group recommends this for the Commonwealth. The better-defined the parameters are in the pilot, the better the leverage during the roll-out. In general, the more business units the implementation covers, the more complex the pilot will be. Parameter-rich products will typically take longer to configure in a pilot, although systems integrators claim to have tools and templates that help streamline configuration.



6. Migrating From Legacy Systems—decide how much historical data to port to the new environment. Since coding structures and reporting hierarchies are likely to change in the new environment, data mapping, conversion-code writing and reconciling converted data to the source can be significant efforts. Manual conversions and the massaging of base data can make conversion even more difficult.
7. Integrating With Other Systems—one new piece of software is unlikely to replace all existing systems, and not all pieces of functionality will go live at the same time. Bridges must be defined and coded, some only temporary. Most modern software architectures should support batch inputs or real-time access through application programming interfaces or remote function calls, but integration across heterogeneous hardware platforms and WANs typically complicates decisions. This is a facilitated step to the extent that the new application resides at the central data center.
8. Customizing—cosmetic changes to user panels, standard reports, help files and documentation are common in most implementations. In addition, the gap analysis identified earlier may call for specific functionality to be custom-developed. This involves deciding whether to use the vendor development toolkit and how best to insulate the custom-developed code from future software releases.
9. Changing Processes and Procedures—many institutions re-engineer processes around new software. This involves identifying activities that can be eliminated, consolidated or automated. It may also involve structural changes (e.g., a centralized shared-services implementation across business units). Again, we recommend this at the Commonwealth. New processes, flows, responsibilities and procedures must be documented and communicated Commonwealthwide. Documenting the new environment is a major, labor-intensive activity in most implementations.
10. Rolling Out the Application—the experiences and parameter definitions of a comprehensive pilot can be leveraged during the larger roll-out. Nonetheless, cookie-cutter roll-outs are rare in real life. Successful locations, business units or processes will argue that they are different, and they will demand an implementation quite different from the pilot. Project planners must be sensitive to this. If the project is trying to drive a common environment, plenty of time will be needed to build consensus. On the other hand, if each unit deserves autonomy, the project scope should include the additional parameter definition and customization each unit will need.
11. Training End Users—no matter how good the package, the project will fail if end users cannot use the system. Decide who will be trained and on which portions of the system. The training coordinator from the HR Division of DTS should be involved upfront. Most vendor-provided training is aimed at the implementation project team; end-user training must be far more granular and customized to reflect the institution's unique processes and terminology. Depending on the



number of users to be trained, an institution may have to maintain a separate system strictly for training purposes. Indeed, a training infrastructure with elaborate registration and scheduling capabilities may be justified in a global roll-out to hundreds of end users.

12. Testing the System—ensure that: 1) the “vanilla” package as installed is bug-free and functionally complete; 2) the parameters defined during the implementation automate the institution’s processes as expected; 3) customizations to the base package perform as expected; 4) the package integrates effectively with other systems in the institution; and 5) the package performs at satisfactory levels (i.e., in terms of response time, batch runtime and the like) at expected volumes of users and transactions. Conduct tests at three levels: the unit, the string (to measure impact across interfaces) and the total system (e.g., a parallel run).
13. Managing Change—attend to the project management chores (e.g., monitoring tasks and deliverables, rescheduling workload across team members and avoiding scope creep). In addition, manage the overall Commonwealth change, keep team morale up and continually communicate the project’s important and time-consuming activities. Systems that cut across traditional agency/cabinet areas demand new ways of managing and measuring process-oriented teams. Many re-engineering projects generate fear and significant resistance. Many roll-outs of a common package are a first attempt at homogenizing diverse business units, hence they run, into various political battles. These obstacles will test the implementation teams leadership; the funds needed to overcome the obstacles must be available. The biggest challenge is ensuring that the project team does not equate success with simply going live on the system. If the system runs fine but fails to meet the larger business goals (e.g., cost reductions or productivity improvements), the project is only a partial success.

***Recommendation (G16). Gartner Group recommends that the technology units in State agencies consider the above best practices when implementing packaged applications.***

### **3.2. MANAGEMENT OF TECHNOLOGY FOR HIGHER EDUCATION**

As part of this study, we also examined the IT environment at two of the major higher education institutions in the Commonwealth, Virginia Tech and the University of Virginia. To do this, we performed two data center Real Decision Benchmarks, one at each of the institutions. The results of these benchmarks are presented as follows:

#### **3.2.1. Benchmarking Comparisons—Virginia Tech**

##### **3.2.1.1. Now Index of Entire Database**

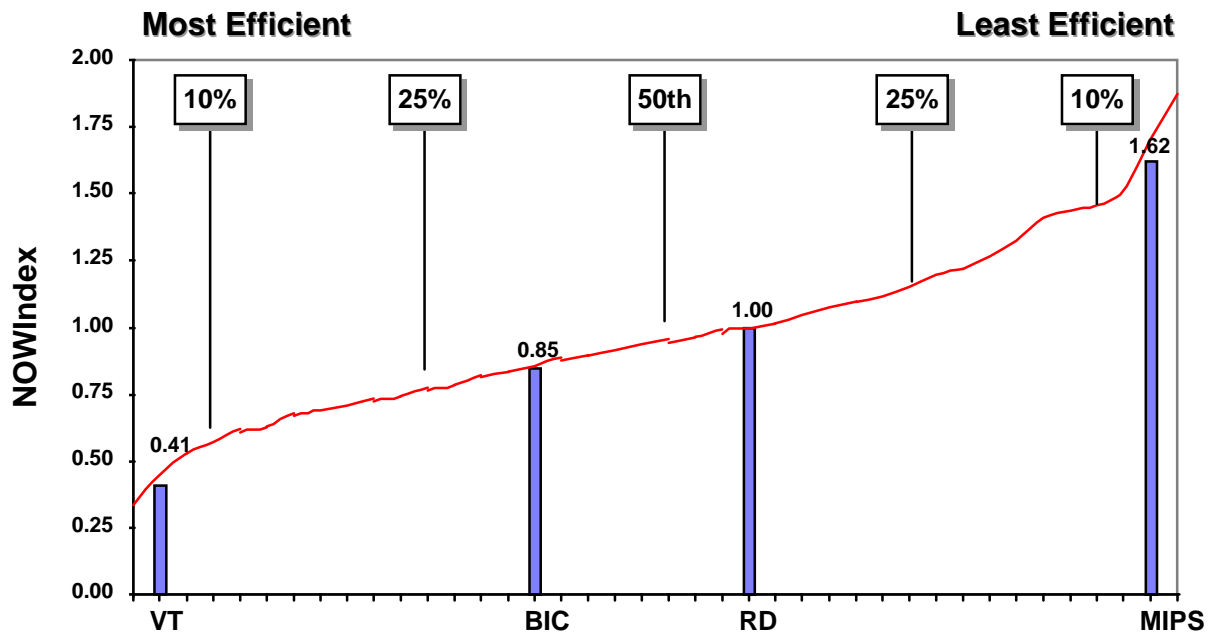
The first figure represents the NOW Index for Virginia Tech against our entire database of companies surveyed. Definitions of the comparison groups are as follows:

- MIPS—represents the average of a sample from the Real Decisions database,



the MIPS range is 61 to 98

- BIC (best in class)—represents five installations with an average installed capacity of 80 MIPS
- RD (Real Decisions)—represents overall average from the database
- VT—represents the Virginia Tech data center



Source: Real Decisions

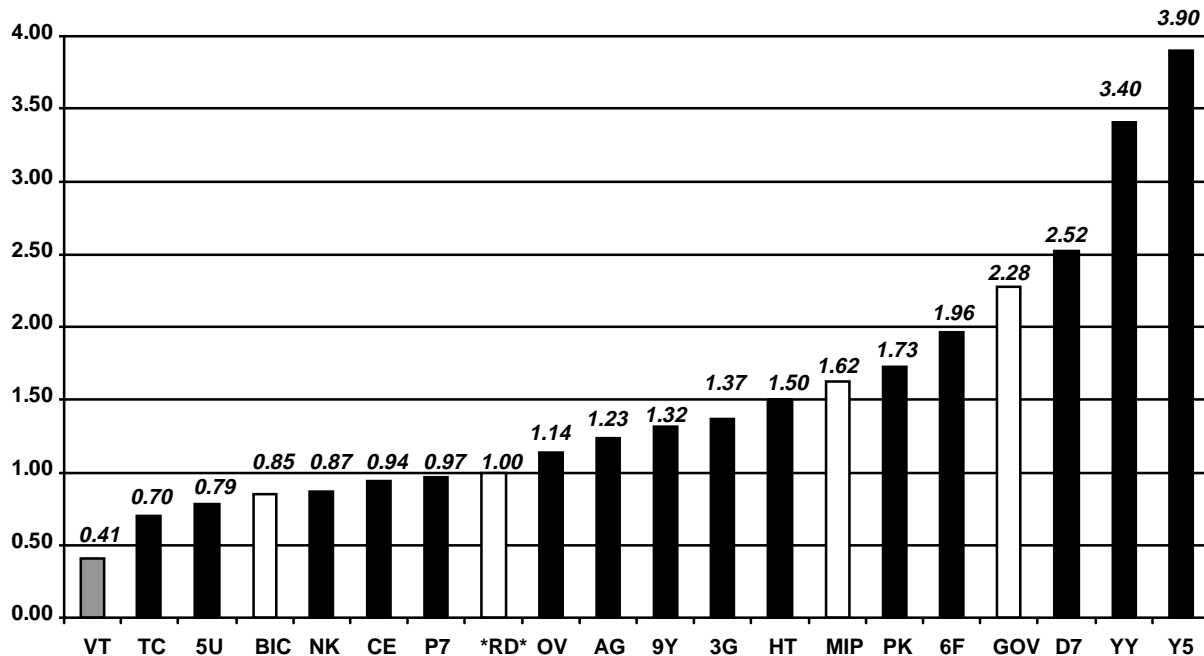
Figure 28. NOW Index Against Entire Database

Gartner Group's results demonstrate a very high level of efficiency at Virginia Tech as compared to the overall database: Virginia Tech is among the most efficient operations we have surveyed through our Real Decisions benchmark.

### 3.2.1.2. NOW Index Against Government Peer Group

Figure 29 provides a view of Virginia Tech against other specific governmental organizations. The intent is to provide a more granular view of the Virginia Tech operation against its peers. The entities BIC, MIPS and RD (overall average) are also represented.





Source: Real Decisions

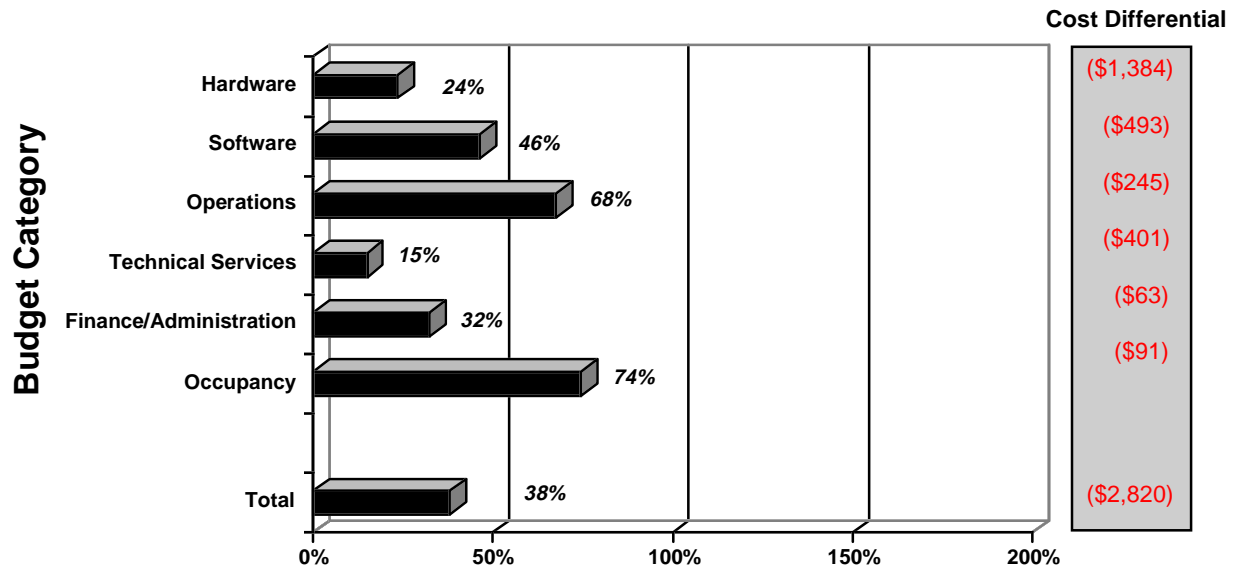
Figure 29. NOW Index Against Government Organizations

Again, we recognize the overall excellent efficiency with which the Virginia Tech data center operates. This operation is the most efficient within the Real Decisions database at this time for this peer group.

### 3.2.1.3. Cost Difference Between Average and Virginia Tech, by Category

Through the next several figures, we begin to examine the detail associated with the benchmarks. This more detailed analysis will allow us to point to challenges associated with managing the data center and allow us to make changes moving forward.

With this figure, we examine the difference in costs between the data center at Virginia Tech and the average. For the purposes of this benchmark, we calculated the average using the peer group. The figure is read as a percentage of the peer group average. A reading of 55 percent, for example, indicates that this particular entity costs 55 percent of the peer group average. This level represents a value significantly less.



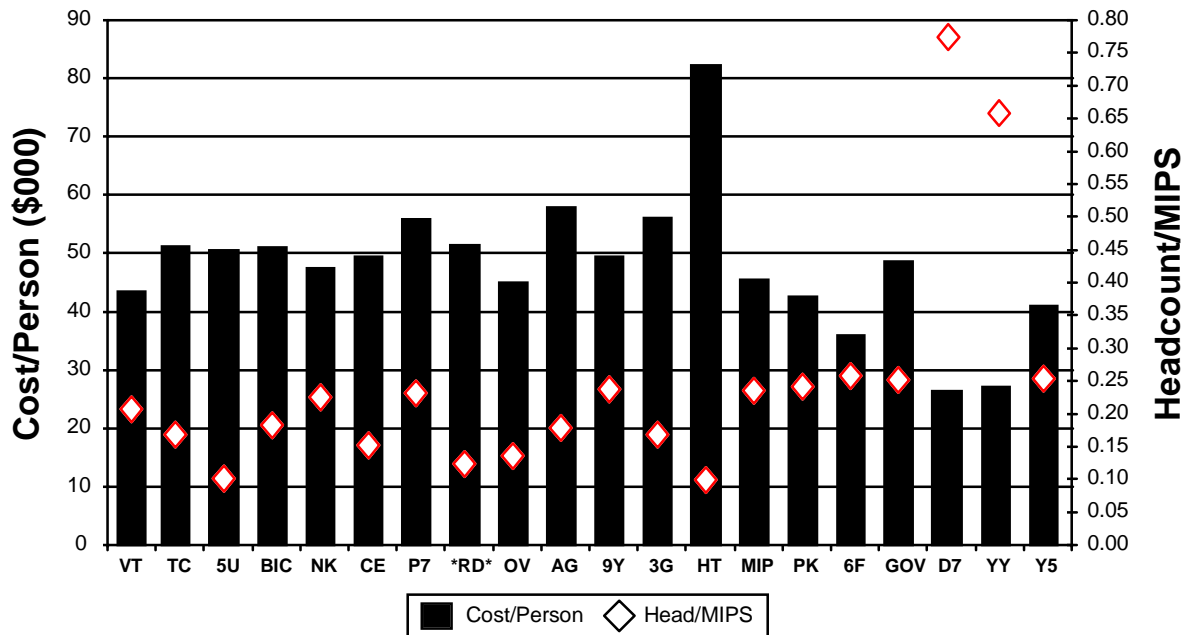
Source: Real Decisions

**Figure 30. Cost Difference between Average and Virginia Tech, by Category**

Across all categories, the Virginia Tech data center is less costly. Areas in particular which contribute to this fact are technical services and hardware. We expect that the hardware costs are driven by the local nature of the data center operation combined with favorable pricing available to education institutions.

#### **3.2.1.4. Staffing Levels and Cost per Person**

Figure 31 serves two purposes. First, using the left y-axis, the cost per person is displayed. Second, the right y-axis provides a view of the headcount per MIPS. Both are intended to provide an assessment of the staffing levels relative to the technology involved.



Source: Real Decisions

Figure 31. Staffing Levels and Cost per Person

This figure illustrates two important points. First, the average cost (salary plus benefits) per person at Virginia Tech is low in comparison to our other benchmarked organizations. We expect this is caused by the geographic location and the academic environment. Second, the headcount per MIPS is slightly lower than average; data center productivity contributes only slight to the overall efficiency of the Virginia Tech data center operation.

#### 3.2.1.5. Value of Work Produced

The following table presents a summary, in both raw metrics and in value, of the workload produced by the entirety of the Virginia Tech data center (the information presented is strictly factual).



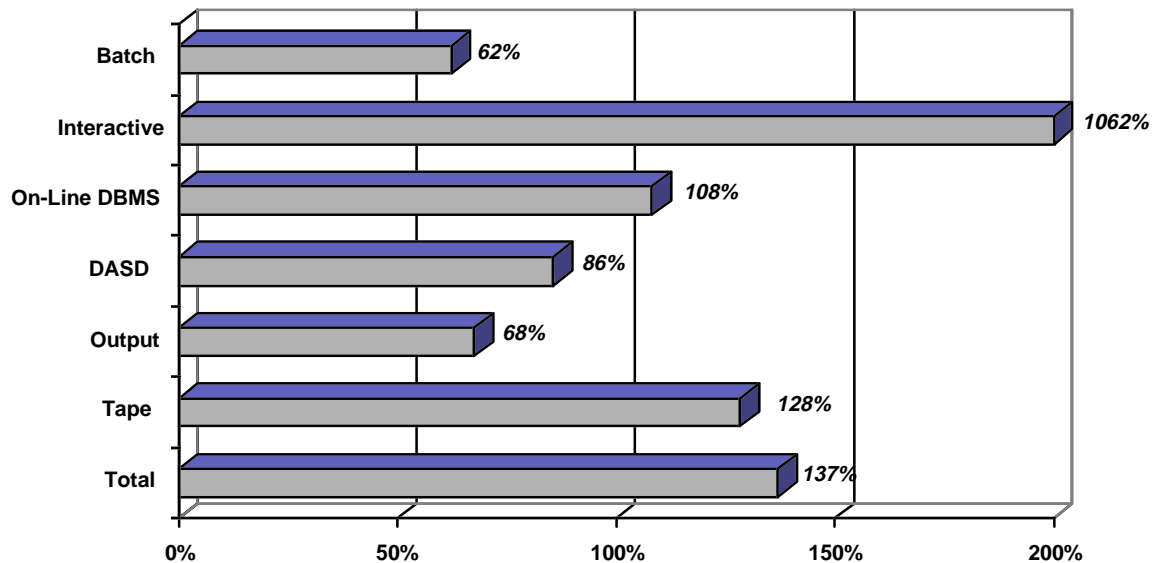
**Table 18. Workload Produced at Virginia Tech**

<b>Workload Category</b>	<b>Annual Production (000's)</b>	<b>Unit Measure</b>	<b>Standard Unit Cost</b>	<b>Value of Work Produced (000's)</b>
Batch	3,037	MIPS Min	\$0.21	\$648
Interactive	6,321	MIPS Min	\$0.32	\$2,032
On-Line	1,596	MIPS Min	\$0.48	\$760
DASD	1,308	MB	\$0.33	\$430
Print	603	K Lines	\$0.33	\$197
Tape Mount	166	Mounts	\$0.58	\$96
Tape Vault	168	Volume	\$0.35	\$59
<b>Total</b>				<b>\$4,222</b>

Source: Real Decisions

### 3.2.1.6. Value of Work Produced Against Peer Group

Here, we examine the difference in several different work categories between the Virginia Tech data center and the peer group average. For the purposes of this benchmark, we calculated the average using the peer group. This exercise affords us the opportunity to examine, in detail, variances between the “standard” and the Virginia Tech data center.



Source: Real Decisions

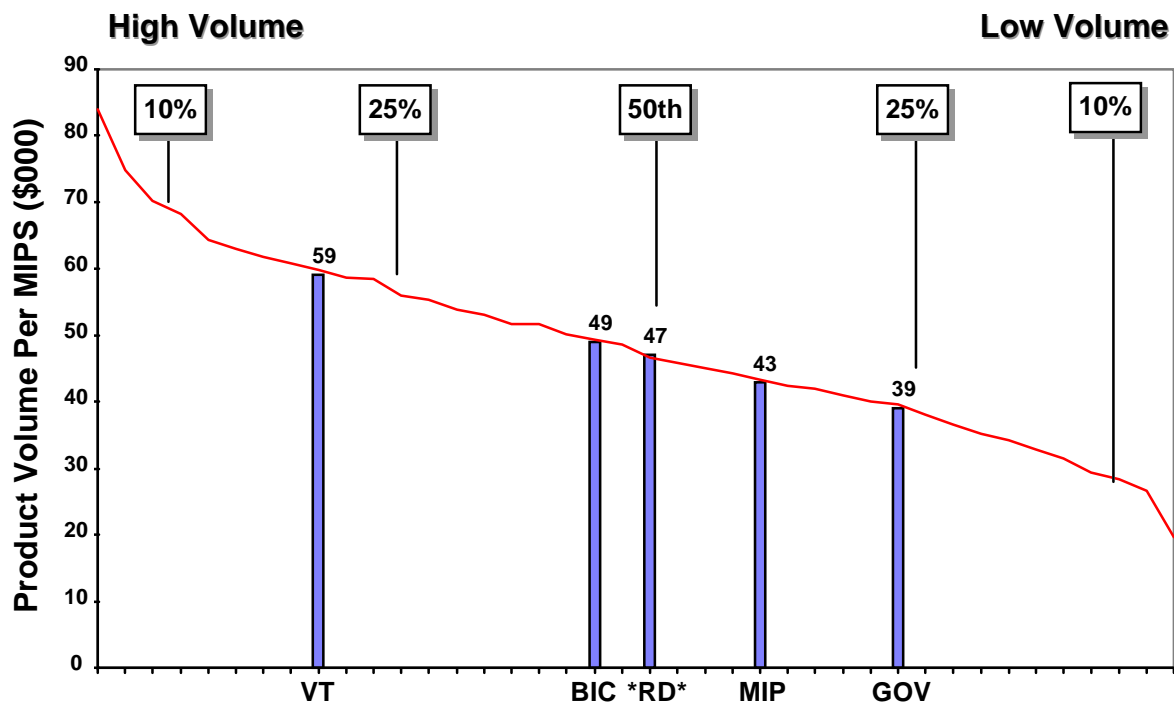
**Figure 32. Value of Work Produced Against Peer Group**



We see that the Virginia Tech data center is heavily (extremely) toward interactive processing. Two of the other categories are also above the peer group average, online DBMS and tape. This is indicative of the prime time usage focus the current application suite has.

### 3.2.1.7. Value of Work Produced Against Overall Database

The figure below presents the value of the work produced by the various groups within the Virginia Tech data center. The work produced is calculated based upon the quantities of “goods” produced by each category, these quantities are then multiplied by standard values created through the Real Decisions benchmark process (these figures are essentially averages compiled from the entire database of organizations surveyed). This figure is then displayed against our entire database.



Source: Real Decisions

Figure 33. Volume of Work Produced Against Database

The Virginia Tech data center operation is fairly active, producing \$59,000 of work per MIPS. This operation is hence within the 20 percent busiest in the overall Real Decision database. This high workload helps the efficiency rating, as there is more work to distribute across the cost base.



### **3.2.1.8. Conclusions**

Several key issues have been identified as a result of a critical review of the benchmark:

- Staffing—operations and technical services costs are below the peer group averages. This is primarily due to lower staffing levels driven by a decision to provide a minimum level of mainframe support during the transition to client/server technology.
- Hardware—hardware costs are well below peer group averages. All of the hardware has been fully amortized. Maintenance costs are the only costs associated with the hardware. The older hardware drives the maintenance costs above the peer group averages. The older disk technology impacts system stability because of volume failures and requires a higher than average level of support. The move to CMOS hardware to bridge the Year 2000 transition should reduce the hardware cost advantage in the short term.
- Software—software costs are below peer group averages. This is driven by the low cost for VM supporting most of the data center's workload. The cost of the MVS software is above the peer group averages. The move to OS/390 in concert with the CMOS hardware should provide software costs savings opportunities and a platform more favorable to client/server technology.
- Disaster Recovery—there are no mainframe disaster recovery costs. Contingency plans need be reviewed annually to ensure realistic and appropriate business recovery.
- Occupancy—data center mainframe occupancy costs are below peer group averages due to the lower cost per square foot and less square feet per MIPS. The IBM 9672-R32 CMOS processor and a move to new DASD technologies will further reduce the requirement for power, cooling, and floor space.
- Capacity Utilization—the high client CPU utilization is driven by the extensive use of the VM system. The VM academic and administrative workloads account for more than 50 percent of the total client CPU utilization.

### **3.2.2. Benchmarking Comparisons—University of Virginia**

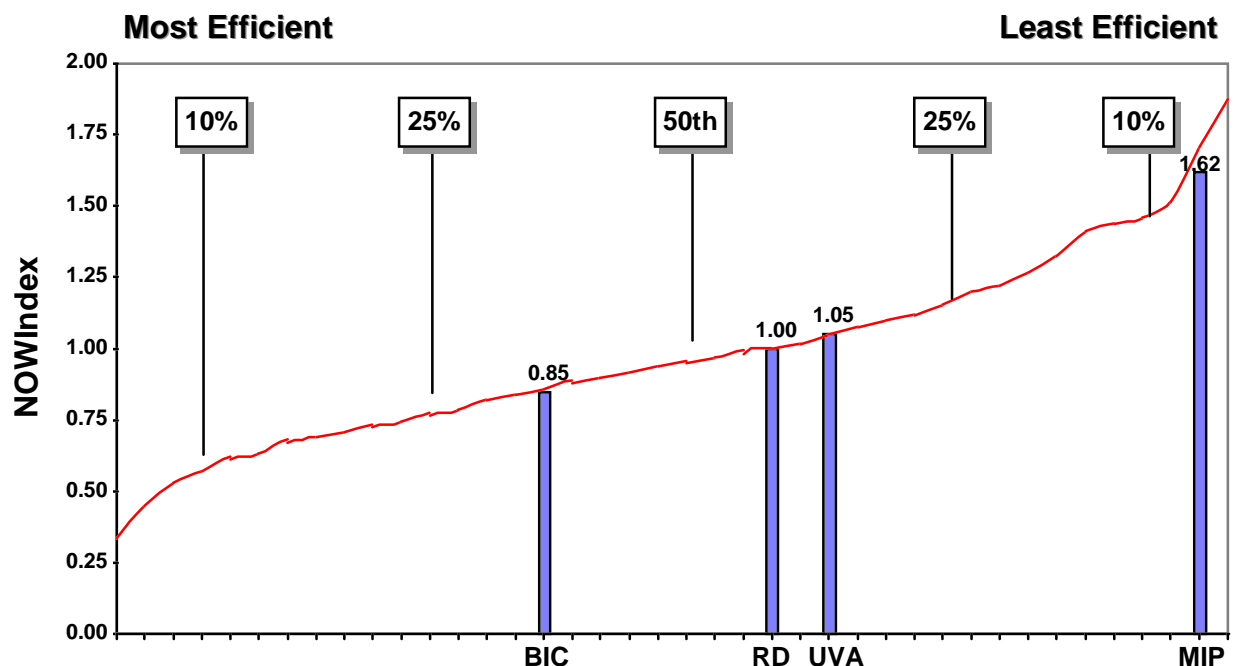
#### **3.2.2.1. Now Index of Entire Database**

Results of the benchmarking analysis for the University of Virginia Data Center were reviewed with University staff in June of 1997. The benchmarking results were approved as accurate at that time. Upon review of the exposure draft of this report, the University requested that additional data be considered in the benchmarking analysis. While the additional data would result in a lower NOW index, the revision would have no material affect on the findings and recommendations of this report. Therefore, Gartner Group, with the concurrence of JLARC staff, determined that no additional analysis of the data provided by the University of Virginia should be completed at this time.



The first figure represents the NOW Index view against our entire database of companies surveyed. Definitions of the comparisons groups are as follows:

- MIPS—represents the average of a sample from the Real Decisions database, the MIPS range is 61 to 98
- BIC (best in class)—five installations with an average installed capacity of 80 MIPS
- RD (Real Decisions)—represents overall average from the database
- UVA—represents the University of Virginia's data center operation.



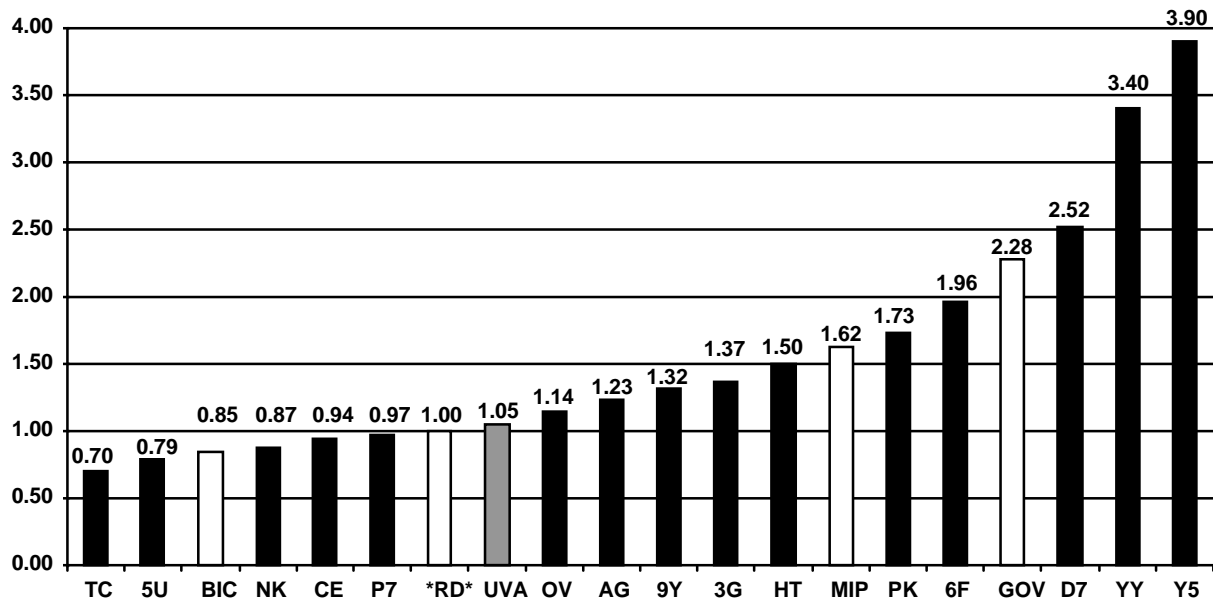
Source: Real Decisions

Figure 34. NOW Index Against Entire Database

The University of Virginia data center operation, with a NOW Index of 1.05, is less efficient than the norm by a small amount.

### 3.2.2.2. NOW Index Against Government Peer Group

Figure 35 provides a view of the University of Virginia against other specific governmental organizations. The intent is to provide a more granular view of the data center operation against its peers. The entities BIC, MIP and RD (overall average) are also represented.



Source: Real Decisions

Figure 35. NOW Index Against Government Peer Group

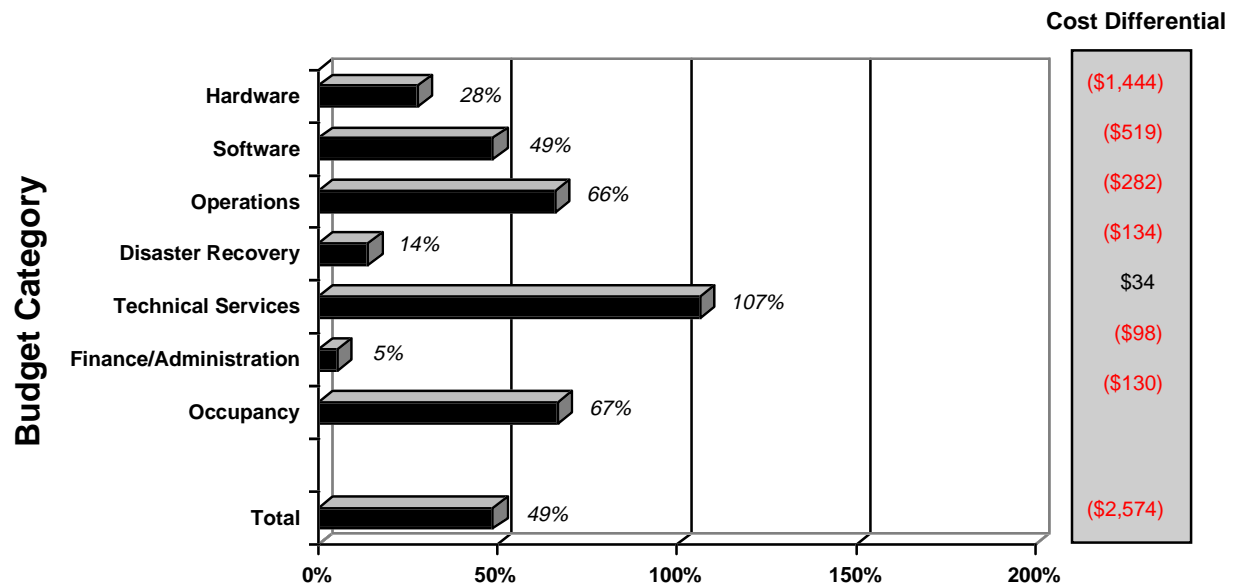
When examining the University of Virginia against its specific peers in the peer group, we see that its efficiency rating is in the top 50 percent for efficiency. Many of the other organizations within this peer group are considered to be inefficient, however, based upon their high NOW Index rating.

### 3.2.2.3. Cost Difference Between Average and the University of Virginia, by Category

Through the next several figures, we begin to examine the detail associated with the benchmarks. This more detailed analysis will allow us to point to challenges associated with managing the data center and allow us to make changes moving forward.

In Figure 36 below, we examine the difference in costs between the data center at the University of Virginia and the average. For the purposes of this benchmark, we calculated the average using the peer group. The figure is read as a percentage of the peer group average. A reading of 55 percent, for example, indicates that this particular entity costs 55 percent of the peer group average. This level represents a value significantly less (which is good).





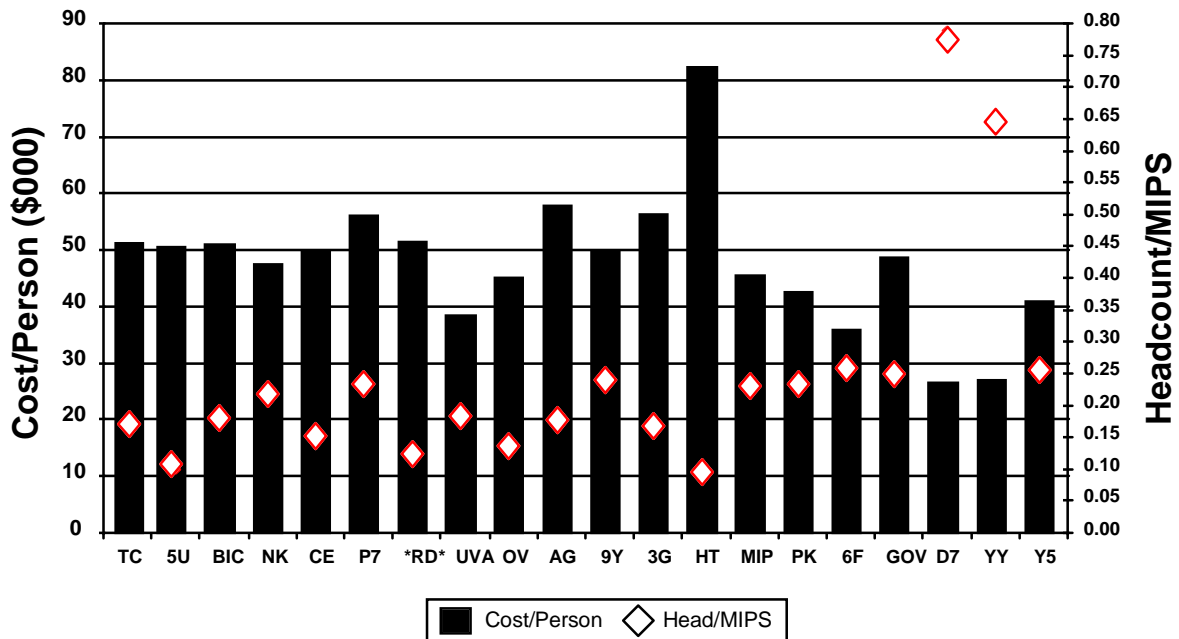
Source: Real Decisions

Figure 36. Cost Difference Between Average and the University of Virginia, by Category

The hardware, disaster recovery and finance/administrative categories are significantly less than our peer group. The availability of low cost hardware via education pricing has resulted in lower hardware costs. The only category which was above the norm is technical services.

#### 3.2.2.4. Staffing Levels and Cost per Person

Figure 37 serves two purposes. First, using the left y-axis, the cost per person is displayed. Second, the right y-axis provides a view of the headcount per MIPS. Both are intended to provide an assessment of the staffing levels relative to the technology involved.



Source: Real Decisions

Figure 37. Staffing Levels and Cost per Person

This figure illustrates the lower average cost of personnel at the University of Virginia geographic area. Productivity rates are slightly better than the average based upon this one statistic.

### 3.2.2.5. Value of Work Produced

The following two tables present a summary, in both raw metrics and in value, of the workload produced by the entirety of the University of Virginia data center (the information presented is strictly factual).



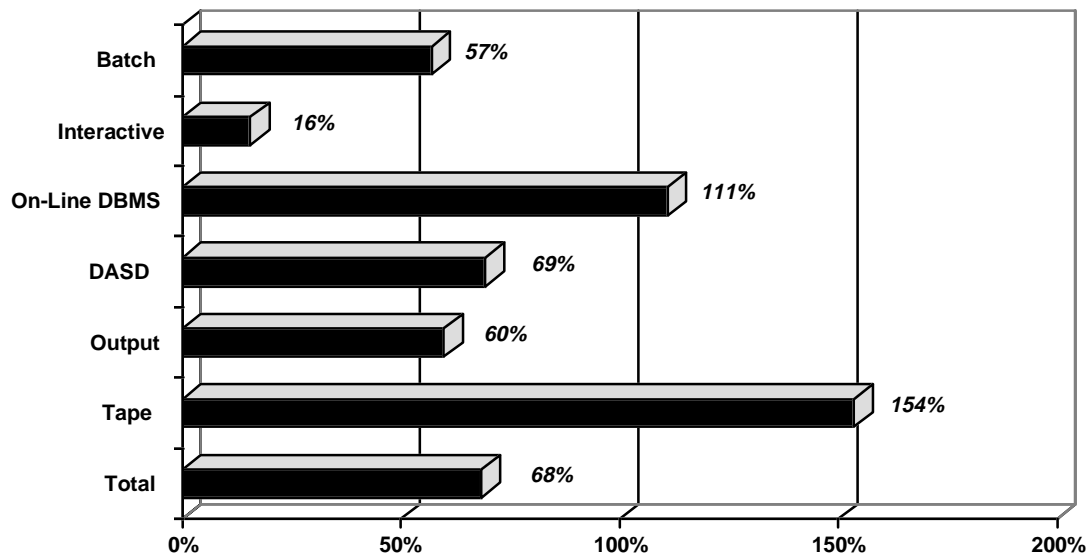
**Table 19. Workload Produced**

<b>Workload Category</b>	<b>Annual Production (000's)</b>	<b>Unit Measure</b>	<b>Standard Unit Cost</b>	<b>Value of Work Produced (000's)</b>
Batch	3,135	MIPS Min	\$0.21	\$653
Interactive	105	MIPS Min	\$0.31	\$33
On-Line	1,376	MIPS Min	\$0.62	\$860
DASD	1,113	MB	\$0.35	\$384
Print	589	K Lines	\$0.33	\$192
Tape Mount	193	Mounts	\$0.58	\$111
Tape Vault	266	Volume	\$0.35	\$94
<b>Total</b>				<b>\$2,327</b>

Source: Real Decisions

### **3.2.2.6. Value of Work Produced Against Peer Group**

In Figure 38 below, we examine the difference in several different workload categories between the University of Virginia data center and the peer group average. For the purposes of this benchmark, we calculated the average using the peer group. This exercise affords us the opportunity to examine, in detail, variances between the “standard” and the University of Virginia.



Source: Real Decisions

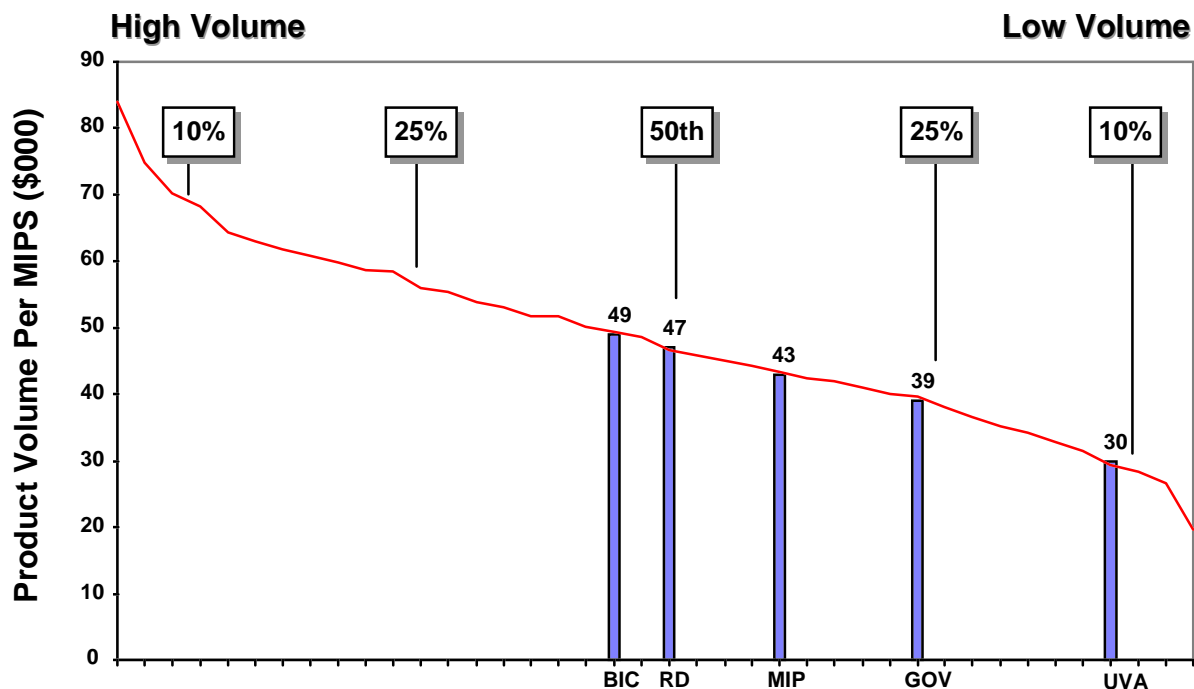
**Figure 38. Value of Work Produced Against Peer Group**



Tape and online transactions are relatively busy factors while the interactive and print output are less active.

### 3.2.2.7. Value of Work Produced Against Overall Database

Figure 39 presents the value of the work produced by the various groups within the University of Virginia data center. The work produced is calculated based upon the quantities of “goods” produced by each category, these quantities are then multiplied by standard values created through the Real Decisions benchmark process (these figures are essentially averages compiled from the entire database of organizations surveyed).



Source: Real Decisions

Figure 39. Volume of Work Produced Against Database

With the University of Virginia data center, we realize a low work product output, based upon the MIPS in use. The value of work is approximately \$30,000 and is in the bottom 15 percent of this group.

### 3.2.2.8. Conclusions

Several key issues have been identified as a critical review of the benchmark performed:

- Staffing—operations costs are well below the custom MIPS Peer Group average. This is due to both lower staffing levels and lower cost per head. Technical services costs are on par with the custom MIPS Peer Group due to the lower cost per head. The staffing levels for technical services are 20 percent above the



custom MIPS Peer Group. Multiple versions of the system software drive up the requirement for systems programmer support.

- Hardware—hardware costs are 70 percent less than the custom MIPS Peer Group average. Processor, DASD and tape costs are only one third of the custom MIPS Peer Group. Print costs are one half of the custom MIPS group. Maintenance of the older technology is higher than the custom MIPS peer group. The review of CMOS and new technology DASD pricing may offer opportunities for growth with cost savings in software and power consumption requirements.
- Software—software costs are one half that of the custom MIPS Peer Group due to unsupported software products. This is a risk that may be minimized moving to CMOS and the use of sysplex software pricing options.
- Disaster Recovery—disaster recovery costs are minimal and should be reviewed annually to ensure that realistic and appropriate business recovery procedures are in place.
- Occupancy—data center occupancy costs are 30 percent below the custom MIPS peer group average driven by both a lower occupied floor space and a lower cost per square foot. A square foot rate of \$13 (equal to the custom Government Peer Group average) was used. A move to CMOS processors and new DASD technology would further reduce the requirement for power, cooling, and floor space.
- Capacity Utilization—client CPU utilization is below the custom MIPS peer group average due in large part to the prime shift workload profile. One half of the total CPU processing is done on prime shift. DASD utilization is on par with the custom MIPS peer group. Overall data center performance is impacted by the CPU workload profile being predominantly prime shift.

### 3.2.3. Different Mission and Environment

Clearly, the mission of the two higher education institutions is distinct and different from that of the Commonwealth, and specifically the executive branch agencies. While all three operate under the auspices of the Commonwealth government, have funding provided for them by the government and are in existence for the overall benefit of the citizens of Virginia, their mission and purpose are not the same.

The University of Virginia is the largest within the state of Virginia, and provides a variety of graduate and undergraduate degrees and programs. Virginia Tech provides a variety of engineering and scientific degrees, among other subject areas. The computing at these universities is of broad spectrum, and provides for the needs of both the academic and the administrative areas. Also of note is the autonomy of each university. Each develops its own strategy and course curriculum, provides for the need of faculty and students and develops and maintains its computer operations.



***Recommendation (G17). The Commonwealth of Virginia should maintain the existing decentralized approach for Information technology services for State institutions of higher education, with the exception of wide area networks, which should be provided by a centralized telecommunications organization. In addition, institutions of higher education should make use of services provided by the Technology Consulting Division recommended in this report.***



## **CHAPTER IV**

### **BLUEPRINT FOR IT STRUCTURE IN THE NEXT CENTURY**



## 4. BLUEPRINT FOR IT STRUCTURE IN THE NEXT CENTURY

Our report calls for the creation of a Chief Information Technology Office to be headed by a Chief Information Officer (CIO). The CIO will also be responsible for the Department of Technology Services (DTS).

### 4.1. CHIEF INFORMATION OFFICER (CIO)

All centralized information technology (IT) is to be headed by the CIO. This individual, who serves at the pleasure of the Governor, would provide day-to-day operational leadership as well as long-term strategic planning for IT in the Commonwealth. The CIO would report to the Governor (and hence be seated on the cabinet), and would directly supervise DTS and the planning functions.

This is a new position for the Commonwealth, and in many ways, it is analogous to the CIO position in private industry. The critical success factors for the successful operation of this new position are as follows:

- Identify and hire the appropriate candidate—this individual must have experience with both state and local government and with operating an “enterprisewide” IT organization.
- Have a view toward agency business—the position must be structured and cultured into the Commonwealth in order to understand the agency business and how to lead each agency’s IT group.

A formal CIO position definition, the position’s role in government, and the qualifications of the ideal candidate follow in more detail below.

#### 4.1.1. Formal Definition

The following defines the CIO at the Commonwealth:

- Develops the DTS vision for the Commonwealth.
- Oversees the development of Commonwealth standards and technology architecture.
- Sponsors the agency technology planning process.
- Manages agency relations.
- Aligns DTS with the business functions of state government.
- Oversees the development of DTS financial management systems.
- Oversees plans to reinvest in the IT infrastructure, as well as business and technology professionals.
- Has responsibility for leading the development of an IT governance framework that would define the working relationship and sharing of IT components between various IT groups within the Commonwealth. This would be accomplished via the Technology Services Council (TSC).





- Possesses extensive knowledge of IT.
- Has strong skills in general and financial management.
- Has strong leadership skills.

#### **4.1.2. Qualifications**

The senior IT executive position is both complex and challenging. This complexity is underscored in trying to identify and define the make up of a successful CIO. Below, we present interesting perspectives and points to several survival skills for successful senior IT executives, CIOs and others:

1. Change Process Manager—ability to participate in and/or manage change process(es).
2. Government Acumen—building and maintaining a strong sense of and for the mission and vision of the government and current politics.
3. Pathfinder—having a curiosity for technology and how it can be applied to generate business value.
4. Marketing—ability to sell and market themselves, their vision and their capabilities inside and outside of the organization to create visibility for themselves and their organization.
5. Leadership—ability to anticipate, identify and respond to changing business priorities and needs while building and maintaining morale amongst the IT professionals.

A key success factor for the CIO is the need to establish and maintain a good working relationship with the cabinet and the Governor. In most state governments, the cabinet establishes the enterprisewide tone for the acceptance of technology. The cabinet can send the message that IT is an important enabler in solving business problems, or that it is an expense item that must be tightly controlled. The CIO must be considered a key member of the cabinet and "have a seat at the table" for affecting overall Commonwealth strategy. This is critical to enabling the alignment of business and IT strategies.

Well-developed communication skills, business knowledge, technical knowledge, vision and leadership would enable the CIO to succeed. By creating a shared IT vision, establishing the necessary relationships and being sensitive to ongoing Commonwealth changes and shifting priorities, the CIO would succeed; this combined with his or her ability to deliver results on time and within budget would help to establish and maintain credibility for both the CIO and the new organization.

#### **4.1.3. Planning and Standards Function**

This group would have the responsibility for providing necessary and appropriate plans for the IT environment of the Commonwealth over the two- to four-year time horizon. The group is to report directly to the CIO. This group would work with the Technology



Services Council (TSC) to enact plans created (the TSC is discussed in more detail in this document). This group would also provide two-way communications between the agencies and the DTS. This group would also have responsibility for the publications and communications component of the DTS.

This group would have responsibility for the technology standards setting process and would ensure its success through the TSC and the Division of Purchasing and Supply and DGS. Best practice management techniques, creation and dissemination would also be the responsibility of this group

Lastly, this group would be responsible for the creation of a life-cycle approach to systems management. Once developed, the group would communicate the results to the agencies via the TSC. We expect that the current life cycle activity at CIM will be transferred to this group. Through this approach, the CIO will have approval authority over key milestones in the applications development process. The CIO will have this authority when the total systems cost exceeds \$250,000.

#### **4.1.4. CIO Office Summary**

A Gartner Group report sanctioned by JLARC examined the issues faced by the Commonwealth with respect to their year 2000 problems. This report called for the creation of a Year 2000 Project Management Office. The report also recommended the placement of this office within the Central Information Office. No maximum employment level (MEL) provisions have been made for the Year 2000 Project Management Office through this report.

We recommend that the MEL of the CIO's office to be 16 professionals. These 16 professionals breakdown into: two for an internal DTS audit function; two for administrative professionals; one for the CIO position; and eleven for the planning and standards group. Compared with the current operation of DIT, this operation is new.

***Recommendation (G18). The Virginia General Assembly may wish to reorganize the information technology functions of state government by assigning responsibility for all information technology policy, planning, and services to a Chief Information Officer. The Chief Information Officer should be appointed by the Governor, subject to confirmation by the General Assembly. The Chief Information Officer should report to the Governor and serve as a member of the Governor's cabinet. The Virginia General Assembly may wish to establish in law specific management and technical qualifications for the position of Chief Information Officer. The role of the Chief Information Officer should be reviewed on a periodic basis to ensure that the office is appropriate to the changing information technology environment.***



## 4.2. CREATION OF THE DEPARTMENT OF TECHNOLOGY SERVICES

### 4.2.1. Mission Clearly Defined

Our report recommends the creation of a new office, called the Department of Technology Services (DTS). This office would manage the centralized IT capability at the Commonwealth and provide leadership and direction for the agency IT capability throughout the Commonwealth. In many respects, this group is a replacement of the DIT, in many ways it is not (the differences will become apparent in this section).

This DTS is to be headed by the Director of Technology Services, who will serve at the pleasure of the Governor. This office will be responsible for the day-to-day tactical operations of the department. This office will have a MEL of three. Each of the three Directorate Offices will be headed by a director, have a MEL of two and report to the director of DTS.

Commensurate with the creation of the DTS is the dismantling and transferring of many of the DIT's resources and personnel as necessary. This will include the data centers, hardware and software, and other items. We are not suggesting a complete re-hire process for all current DIT professionals.

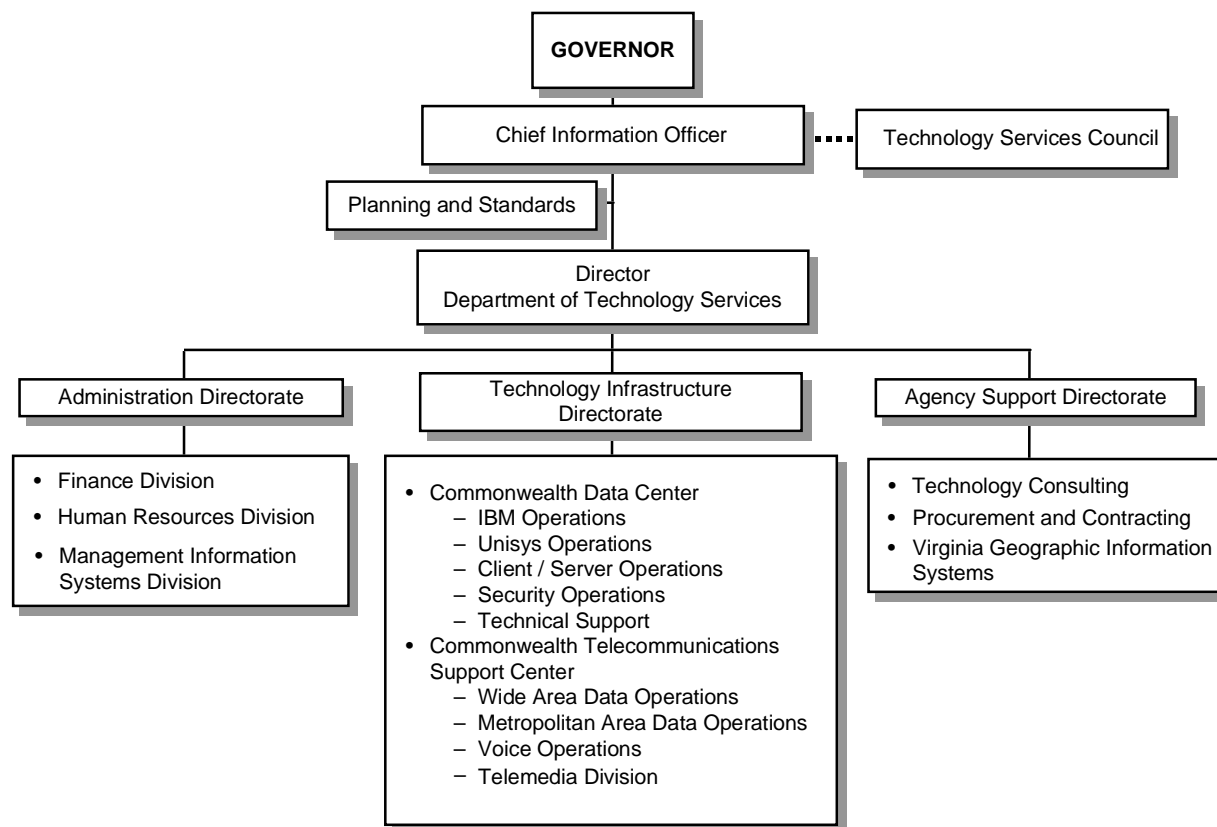
Specifically, the DTS would have responsibility for the following components (organization is a suggested structure):

- Technology Infrastructure Directorate—implements, plans and maintains the technology infrastructure, essentially the computer operations and telecommunication operations. Much of this group is transferred from the current DIT as it exists now. This group includes the following two major areas with nine operational groups:
  - Commonwealth Data Center
    - » IBM Operations
    - » Unisys Operations
    - » Client/Server Operations
    - » Security Operations
    - » Technical Support Operations
  - Commonwealth Telecommunications Support
    - » Wide Area Data Operations
    - » Metropolitan Area Data Operations
    - » Voice Operations
    - » Telemedia Division.
- Agency Support Directorate—this group has been created to support the agency IT organizations. This directorate includes the following three areas:



- Technology Consulting Division
- Procurement and Contracting Division
- Virginia Geographic Information Network.
- Administrative Directorate—provides the necessary administrative services for the DTS. Many of these groups are operating under the DIT today and include the following three areas:
  - Finance Division
  - Human Resources Division
  - DTS Management Information Technology Division.

The new information technology structure is summarized in figure 40.



Source: Gartner Group

**Figure 40. Information Technology Organizational Structure**

#### 4.2.2. The New Cost Allocation Scheme

Gartner Group expects much debate and discussion regarding the proposal put forth in this section. Below, we attempt to present the scheme in a straightforward and simple



way. The new scheme is simple and one that Gartner Group believes more fairly charges for the services to be provided by DTS. Below is the list of divisions and how they would be funded (the A87 rules in effect now would still apply):

From the indirect chargeback mechanism:

- Chief Information Officer (fees to be charged to the universities as well)
- Planning and Standards Division (CIO Office)
- Finance Division
- Human Resources Division
- DTS IT Division
- Procurement and Contracting Division.

Charge back based on direct rates; rates set for zero profit within each division. Gartner Group expects that rates would drop as the overhead associated with DIT is diminished.

- Telemedia
  - Chargeback as currently performed.
- Commonwealth Data Center Divisions
  - Chargeback as currently performed.
- Commonwealth Telecommunications Support Center Divisions
  - Rates for wide area data services are to be charged on a usage basis, not per connection. The new wide area data contract would be required to support this.
  - Voice charges would no longer have overhead for bill processing (data would no longer have the overhead as well).
- Technology Consulting Division
  - Per hour rates, based upon rates discussed elsewhere in this report; manage to small (less than five percent of revenue) or zero profit.

Any entity which cannot adequately recover its costs must reduce costs and/or increase revenues to make the entity viable from a financial perspective. The CIO will maintain a fund to adequately fund new entities (which would eventually be on direct rates) until such entities are viable.

***Recommendation (G19). The Virginia General Assembly may wish to consider continuing the use of internal service funds to finance and account for the services provided by the Department of Technology Services. The three funds should be the Computer Services Fund, the Telecommunications Services Fund, and the Technology Consulting Services Fund. Expenses of the Office of the Chief Information Officer should be recovered as overhead in the direct charges for the internal service funds.***



Below, is the detail on the overview of the directorates and divisions.

#### **4.3. ORGANIZATION OF ADMINISTRATIVE DIRECTORATE**

This directorate has the following three divisions:

- Finance Division
- Human Resources Division
- DTS Management Information Systems Division.

The last part of this section provides a description of each division, its responsibilities and its contrast to the current DIT structure.

##### **4.3.1. Finance Division**

The Finance Division would provide accounting, financial reporting, internal production and contract administration, and financial analysis services to all DIT departmental programs. More specifically, this group would have the following responsibilities:

- Cost Recovery—this division would develop and execute a cost recovery, or chargeback mechanism to properly cover costs incurred by the DTS. This strategy would be established to properly motivate DTS to lower overall costs and to encourage the use of its services by all of the agencies.
- Budget—this division would develop a biennial tactical budget for use by DTS division managers and a longer-term strategic budget to preserve necessary and vital funding for critical IT budgets (this is to eliminate the project cancellation issues that have been associated with certain past IT projects). This budget process includes interaction with the agency IT organizations through their managers to properly forecast usage and budget rates.
- Capacity Planning—this division would provide an accurate view of current capacity and current used capacity and would properly predict future IT resource needs. This would assist in the capital budgeting process.

Compared with the current operation of the DIT, this operation would perform functions similar to the Finance and Technology Resource Management Divisions now at DIT.

We recommend the MEL of this division be 25 professionals.

##### **4.3.2. Human Resources Division**

The Human Resources Division would continue to be responsible for the management of the human resources program, internal training, career development and technical presentations for the division. We make the following recommendations which are either directly or indirectly related to the Human Resources Division.

- Each technical professional would be allotted 10 days for training over every calendar year. Five of these days would be in classes sponsored by the Commonwealth and would be attended by a wide audience within the DTS.



These courses might include Visual Basic basics or NT administration basics. The balance of five days may be spent based upon mutual agreement between each professional and this person's manager.

- Pay equality—this is a very difficult issue to address in the Commonwealth. Gartner Group salary benchmarks indicate that many salaries are below market for the technical professionals performing technical activities. Research is available from primary sources which outline average salaries for “standard” technical positions. We recognize changing the pay scales is beyond the scope of this particular division, but we believe the initiative must come from here. The plan would be a migration and increase of pay scales to market rates over a three-year period.
- Manager-to-professional ratio—while this area is perhaps better dealt with at the CIO office-level, it is a human resources issue as well. We recommend a ratio of one manager for every six professionals. The current structure consists of many government-level 18 and higher professionals, and hence results in a relatively senior organization. Forcing a more traditional (from a private industry sense) reporting relationship would help lower costs and provide for a more balanced organization to focus on key operational issues.
- Training Coordinator—a training coordinator position would be created to supervise, direct and coordinate all training and the training program itself.

It should be noted that the DIT has a technology training program in place now which many DIT professionals employ as part of their professional development plans.

Compared with the current operation of DIT, this operation would perform functions similar to the Human Resources Division now at DIT. The Communications and Publications operations, however, now would fall under the Planning and Standards Division.

Gartner Group recommends the MEL of this division be 10 professionals.

#### **4.3.3. DTS Management Information Systems Division**

This group would provide for the internal IT needs of the DTS. We recommend that this division be organized the same way as the IT organizations (detail is provided below).

Compared with the current operation of DIT, this operation would perform functions similar to the MIS Division now at DIT.

Gartner Group recommends that the maximum employment level of this division be 18 professionals.

#### **4.4. ORGANIZATION OF TECHNOLOGY INFRASTRUCTURE DIRECTORATE**

This directorate would have the following two divisions and nine operational groups:



- Commonwealth Data Center
  - IBM Operations
  - Unisys Operations
  - Client/Server Operations
  - Security Operations
  - Technical Support Operations
- Commonwealth Telecommunications Support Center
  - Wide Area Data Operations
  - Metropolitan Area Data Operations
  - Voice Operations
  - Telemedia.

#### **4.4.1. Commonwealth Data Center Division**

##### **4.4.1.1. IBM Operations**

The IBM Operations Group would continue to be responsible for the operation of the IBM mainframe environment. This includes providing general utility and data management software products to support batch processing, online processing and remote job entry.

##### **4.4.1.2. Unisys Operations**

The Unisys Operations Group would continue to be responsible for the operation of the Unisys mainframe environment. This includes providing general utility and data management software products to support batch processing, online processing and remote job entry.

##### **4.4.1.3. Client/Server Operations**

The Client/Server Operations Group would be responsible for the operation of any client/server servers used at the Commonwealth. This includes providing general utility and data management software products to support batch processing, online processing and remote job entry (to the extent necessary).

This operations group represents a new group for the Commonwealth. Its first platform would be the Unix platform, which is currently being operated at the DIT for the IHRIS project. The need for centralized data processing for the server in a client/server environment is clearly needed; many agencies, individually, perform this function now.

In an attempt to gain economies of scale and to provide quality operational support, this group should be created. We expect that Unix would be the predominant technology, and that many agencies would seek to use this operation as the group grows and matures. Other technologies, particularly Microsoft NT (as a server operating system)





would also be strong candidates for inclusion in this new operation in the near future.

This organization would be funded via a similar chargeback scheme to that used by the Unisys and IBM operations now.

This operations group is not being established, at least initially, as one suited for operating network servers, such as Banyan, Novell, or NT (in a network server role); those activities would remain with the agencies. This group would deal with processors for execution of agency applications, those deemed critical to the agency.

There would be several challenges associated with this scenario. First, this centralization would require excellent wide area capability as the users and their PCs would need connectivity to the client/server systems. Technology is available to support this concept; proper management of the same would be a challenge initially. Second, the transfer of assets from the agencies to the DTS would be necessary, we expect, for any agency transferring operation to the client/server operations group. The logistics of such a transfer would require forethought and a sound contingency plan.

Compared with the current operation of DIT, the above three operational groups would perform functions similar to the Computer Operations Division now at DIT, with the added responsibility of the client/server environment.

#### **4.4.1.4. Security Operations**

The Security Operations group would have responsibility for the following areas:

- Overall database security—responsibility for ensuring that all electronic database are secure from outside interaction and viewing.
- Disaster recovery—responsibility for ensuring that adequate plans are in place should a minor or major outage of computing resources occur. This includes disc drive outages as well as major computer systems failures.
- Physical security—responsibility for ensuring that all computer resources are properly guarded against theft and improper or malicious usage.

Compared with the current operation of DIT, this operation would perform functions similar to the Security Division now at DIT.

#### **4.4.1.5. Technical Support Operations**

The Technical Support Operations group would have responsibility for the following areas:

- MVS Database environments—technical support for ADABAS, IMS and DB2.
- Unisys Database environments—technical support for DMS1100 and MAPPER.
- Relational Database environments—technical support for relational database environments, including Oracle.



- Automated Systems—support and promotion of automate operations tools and environments across all three operational groups.
- MVS Systems Software Support—technical support for MVS and all related systems sub-components.
- Unisys Systems Software Support—technical support for both the operating systems and the unique Unisys-data communications systems.
- Client/Server Systems Software Support—technical support for the operating systems utilized in the client/server operations group.

Compared with the current operation of DIT, this operation would perform functions similar to the MVS Database, Unisys/Unix Database, Automated System, MVS Systems Software Support and Unisys Systems Software Support groups now at DIT.

Gartner Group recommends the MEL of this division be 149 professionals. The number of professionals required to support the Unisys environment would decline as the number of professionals required for the client/server environment increases.

#### **4.4.2. Commonwealth Telecommunications Support Center**

##### **4.4.2.1. Wide Area Data Operations**

This group would have responsibility for the WAN across the Commonwealth. This includes connections of SNA-type via the frame relay network. Almost all of the Commonwealth's traffic is carried on these two networks, with other network entities having responsibility for a small portion.

Gartner Group's data collection efforts indicated four important concerns regarding the CTN as it is currently configured:

1. Each agency pays the same for a connection regardless of the bandwidth used. This makes it difficult for the DIT, since it must provide connectivity assuming close to full utilization; and unfair to the agencies which utilize little of the bandwidth assigned via a connection.
2. More advanced, and perhaps less expensive connectivity is not being provided by the DIT. This is mainly the result of the long-term contract in place to provide these frame relay only services.
3. Capacity planning is not performed. This point, related to point one above, deals with the lack or utilization of control/knowledge that the DIT has over the frame relay network now. Understanding future needs in network capacity must be improved.
4. The DIT needs to maximize revenues. The chargeback structure of the DIT encourages the establishment of as many connections to the frame relay network as possible. This has occasionally resulted in multiple connections to a given geographic site when one would have been satisfactory. This is not in the



best interest of the Commonwealth.

This new operation would have total and exclusive authority and responsibility for the WAN across the Commonwealth. Any agency seeking to build and/or operate its own wide area data network would need to seek approval from the CIO. Any current network operations should come under the DTS by the end of 1998.

This new operation would also procure a new WAN/scenario as the current contract expires. This effort is already underway with the new DIT network RFP recently issued. This would be performed with the following objectives considered (among many others):

- Bandwidth sensitive connections—DTS should provide bandwidth sensitive options, (tiered as necessary) and charge different rates accordingly.
- Fault-tolerant—the network created should provide a necessary level of availability and hence availability.
- All points of presence—the network must provide connectivity to all Commonwealth locations.

Compared with the current operation of the DIT, this operational group would perform functions similar to the components of the Telecommunications Division now at the DIT.

#### **4.4.2.2. Metropolitan Area Data Operations**

This group/division would have responsibility for the MAN. As discussed elsewhere in this report, the MAN is a downtown area network utilizing state-owned right-of-way (tunnels essentially) and network components to provide data communications between buildings connected by this same right-of-way. Typically, the buildings included are on Capitol Square and other buildings in the immediate vicinity.

This network was designed and installed by the DGS, and was paid for out of the leasing fees; DGS believes that this infrastructure is a component of office space, as is HVAC and electricity. While this view has merit, we believe the overall interests are better served by transferring this capability (i.e., the MAN) to the DTS. The DTS would likely have a better perspective on the overall needs for IT and can provide technical support and inter-connectivity with the Commonwealth WAN.

This group/division would continue to operate the MAN as did DGS and expand its connectivity to all buildings within downtown Richmond which are inexpensively connected via right-of-ways. The use of fiber in these environments would provide very low-cost, high bandwidth to the downtown area, with connections to the balance of the Commonwealth through the WAN reasonably achieved.

The local exchange carrier, Bell Atlantic, may not view this loss of services on its network well. As with the Commonwealth, Bell Atlantic is able to inexpensively provide capability to this small geographic area. The upcoming contract renewal would be an excellent opportunity to make the necessary changes to permit the MAN operation to



continue under the auspices of the DTS.

Compared with the current operation of DIT, this operation is new.

#### **4.4.2.3. Voice Operations**

The Voice Operations group would be responsible for the management and coordination of the Commonwealth's local and long distance voice services. This would include the procurement of necessary hardware and long distance connectivity/services as needed. This group provides network monitoring, customer assistance functions in both Richmond and Roanoke and directory assistance services for the entire Commonwealth.

Compared with the current operation of DIT, this unit would perform functions similar to the Voice Engineering organization of the Telecommunications Division now at the DIT.

Gartner Group recommends the MEL for the Telecommunications support center to be 22 professionals allotted as 12 to data, five to MAN, and five to voice.

#### **4.4.2.4. Telemedia Division**

This division would continue to have responsibility for the videoconferencing services and the like. This includes audioconferencing bridging services and the coordination of Commonwealthwide teleconferencing capacities. Applications of these services include education and administrative teleconferencing. The division would also continue to provide agencies and institutions with technical expertise and training in the use of teleconferencing technologies.

This division would also continue to be responsible for the negotiation and administration of contracts for services and facilities with public broadcasting stations in the Commonwealth. This division would contract for services with these entities on behalf of educational institutions, state agencies and school divisions.

Arguments had been made for this group's placement within the DGS or some other agency. However, given the focus the DTS would have on technology, placement of Telemedia in this directorate is appropriate.

Compared with the current operation of the DIT, this operation would perform functions similar to the Telemedia Division now at the DIT.

Gartner Group recommends the MEL of the Commonwealth Telecommunications Support Center to be 31 professionals.



#### **4.5. ORGANIZATION OF AGENCY SUPPORT DIRECTORATE**

This directorate would have the following three divisions:

- Technology Consulting Division
- Procurement and Contracting Division
- Virginia Geographic Information Network.

The balance of this section provides a description of each division, its responsibilities and its contrast to the current DIT structure.

##### **4.5.1. Technology Consulting Division**

This organization would provide a full range of applications development services. These services include, but are not limited to: business analysis, enterprise re-engineering, information processing requirements, LAN design and implementation, applications development work, packaged applications implementation, and maintenance of applications. The resources in this group would be available for hire on an hourly basis or, where needs warrant, on a project basis.

Compared with the current operation of the DIT, this unit would perform functions similar to the Technology Consulting Division, Systems Development Division and the Information Engineering Division now at the DIT.

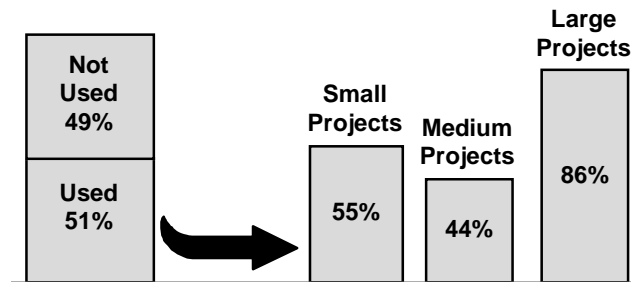
Gartner Group initially recommends the MEL of this division be 40 professionals. This group is to operate as its own profit and loss center, and should retain only as many professionals as can be profitably supported.

The following information provides best practices and other pertinent information intended to make this organization more attractive to the user agencies.

##### **4.5.1.1. Outsourcing—Use of External Service Providers (ESPs)**

As the client/server computing model expands to address more-complex business processes, the issue of hiring ESPs becomes a question for many state governments. ESPs are firms that are separate legal entities from the contracting company, and that provide services such as consulting, software development, systems integration, and outsourcing.

Our discussion here relates to the proper use of a contracted ESP; we believe this information is very relevant to those agencies seeking external help. How often are consultants, software developers and integrators used in client/server projects? What functions do they typically perform, and for what reasons? To answer these questions, Gartner Group conducted a study of more than 100 mature client/server projects, and asked a series of questions concerning experiences, including the use of ESPs (see Figure 41 below).



Source: Gartner Group

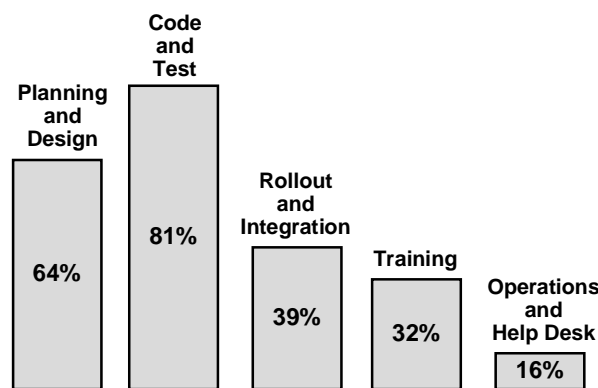
**Figure 41. Use of ESPs in Client/Server Projects**

More than one-half of the projects that were studied employed some form of professional assistance. Use did vary by project size, but the pattern was unpredictable. Size class definitions are as follows:

- Small Project—1 to 99 workstations
- Medium Project—100 to 4,999 workstations
- Large Project—5,000 or more workstations.

Small projects, in which one might expect to find less client/server expertise and therefore a greater dependence on outside help, were only slightly above the average. Large projects, in which technical expertise should be plentiful, made the greatest use of external help.

When asked for the type of services used, organizations typically sought help in the earlier stages of implementation (see Figure 42 below). A typical project used two of the five functions identified, and only one project of the 117 that were studied used all five. Planning, design, code and testing led the responses, while operational assistance lagged. This distribution would likely change as client/server evolves and more operational challenges surface.

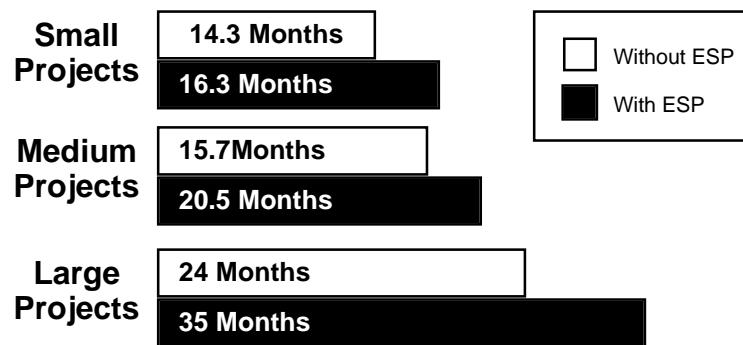


Source: Gartner Group

**Figure 42. Use of ESP Function**



One surprising result was the impact of ESPs on project deployment time (see Figure 43 below). Overall, client/server projects that used ESPs took an average of five months longer to implement than those without external help. When the comparison was made by project size, a consistent pattern emerged, with the difference increasing from two months for small efforts to almost a year for larger ones.



Source: Gartner Group

**Figure 43. ESP Impact on Client/Server Project Implementation Time**

This data suggests that the use of external professional help does not necessarily guarantee shorter implementation cycles. Our analysis also indicates no significant difference in success rates between projects with or without ESPs. When users were asked to evaluate their experiences with project duration, cost and complexity vs. their original expectations, the client/server projects without ESPs scored better in all three categories.

Several factors contribute to these results. It takes time to select an ESP and to coordinate project activities. Many client/server projects do not employ ESPs to reduce project time or replace existing staffs, but rather to produce a skills transfer of essential client/server expertise from the ESP professional to the enterprise's own staff. Organizations can then become self-sufficient for future client/server efforts. Users may also be expecting too much from their ESPs. Clients should perform an honest assessment of their capabilities. Where client/server skills are absent, they may face no option but a heavy reliance on ESP help.

#### **4.5.2. Procurement and Contracting Division**

The procurement and contracting organization would have a new role in the DTS. There are two reasons for this. First, the network, a critical component of the IT capability at the Commonwealth, must be more effectively managed—improved management includes better and centralized procurement. Second, the concept of technology standards would necessitate a more focused view toward procurement.

This group would have responsibility for coordinating the procurement needs of DTS, the agencies and DGS. Other responsibilities include procurement of the WAN and conceptualizing any privatization scenarios. More specifically, this division has the



following responsibilities:

- WAN—commensurate with DTS' responsibility for the WAN is this division's responsibility for procuring and contracting for the network (DGS would assist as necessary). This group would conceptualize the network, gain approval through the TSC, and then procure for the network. The technical competence for wide area communications would reside then within this division. This effort would hopefully be accomplished in parallel to the network RFP being issued.
- Outsourcing—this group would, in cooperation with Division of Purchasing and Supply, conduct feasibility assessments for all outsourcing considerations. Its first order of business would be establishing an outsourcing feasibility for the desktop environment in Richmond and other state-office dense areas. In general, this group would examine the feasibility of any outsourcing, basing the feasibility on a cost/benefit analysis. The group would closely monitor industry trends to ensure that the proper outsourcing scenarios are evaluated. In addition, we expect this group will revisit the outsourcing issue for the data center on a regular basis, perhaps every two years. This will continue sound data center management while keeping current with industry trends with respect to outsourcing.
- Contract programming—as is now managed by the DIT, this group would ensure that a balanced and competitive set of contract programmers is available for hire to all of the agencies. This group would work with DGS as necessary to ensure this goal is met. Further, the offerings of the contract programming efforts, as manifested through the contract programs put in place, would be balanced against the offerings of Technology Consulting Division.
- Procurement Assistance—as is performed now in Acquisition Services, this group would provide assistance to other Commonwealth Agencies as they procure IT products and services.

Compared with the current operation of DIT, this operation would perform functions similar to parts of the Finance and Acquisition Services Divisions, but is essentially new. Gartner Group recommends the MEL of this division be 11 professionals.

#### **4.5.3. Virginia Geographic Information Network**

This division responsible for fostering the creative utilization of geographic information and to oversee the development of a catalog of GIS data available in the Commonwealth. Other aspects of the divisions, as originally described and assigned to CIM, remain the same.

Gartner Group recommends the MEL of this division be four professionals.



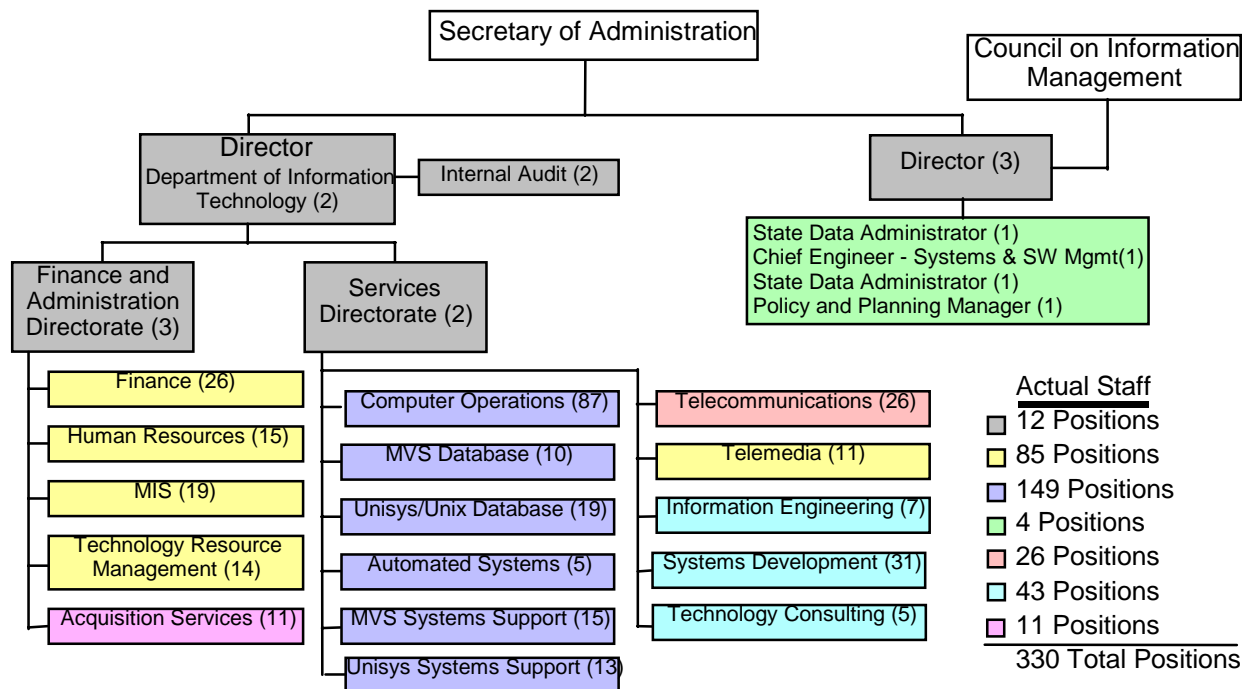


#### 4.6. SUMMARY OF CHANGES TO DIT'S STRUCTURE

The MEL for the new organization would be 312, vs. the current actual FTE count of 330 filled positions (MEL is 361) for DIT and CIM combined.

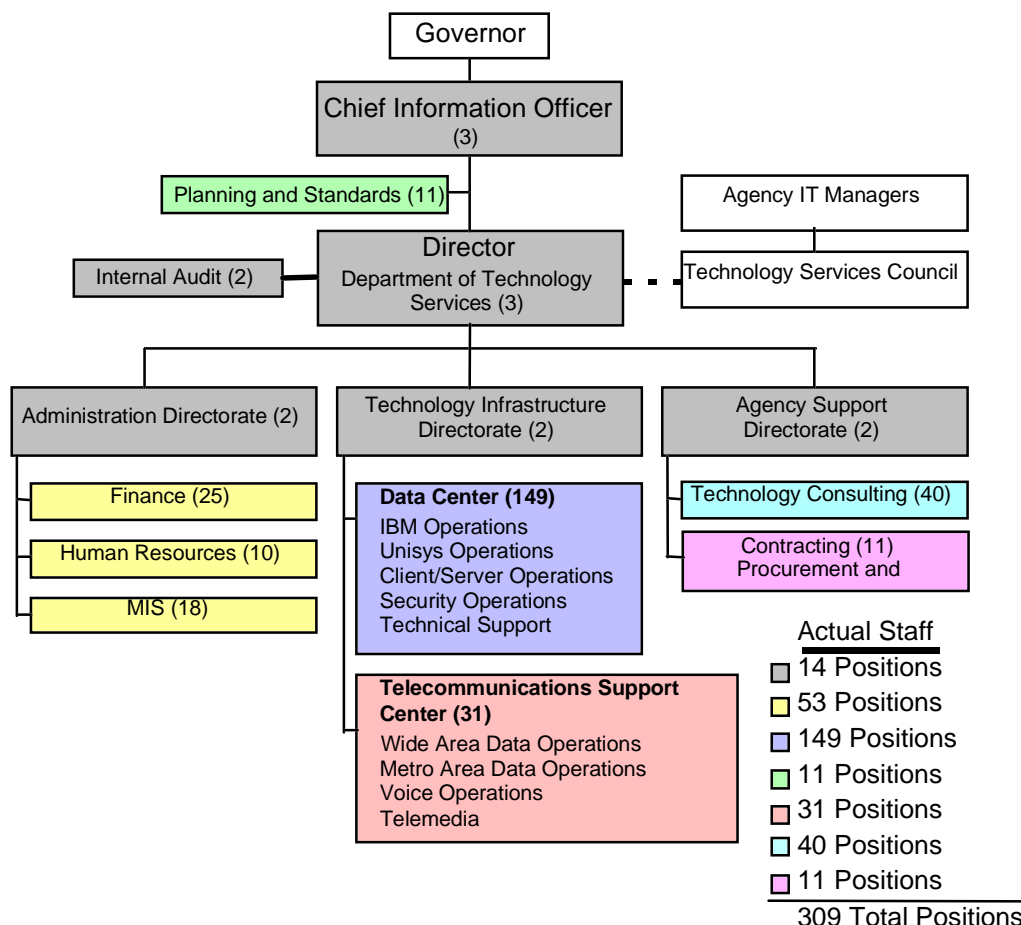
It is appropriate at this point to summarize the changes that is being made to DIT's structure as it is transformed in the DST. Figure 44 below represents the current structure of DIT with the MEL figures for each directorate and/or groups within a give directorate. Figure 45 below represents the structure of the new DST with the MEL figures for each directorate and groups within the directorates. Note that the organizational chart is a suggested organizational structure.

**Recommendation (G20).** *All information technology services and activities now performed by the Department of Information Technology should be re-established in a Department of Technology Services. The Director of Technology Services should be appointed by the Governor and report to the Chief Information Officer*



Source: DIT

Figure 44. DIT Structure and MEL



Source: Gartner Group

Figure 45. DTS Structure and MEL

#### 4.6.1. Council on Information Management (CIM) Abolished

The CIM is the planning and standards setting body for IT providers and users within the Commonwealth. The current structure consists of one director, six employees and eight council members. These council members are intended to incorporate external IT professionals to pollinate the Commonwealth with modern IT concepts and technology.

The CIM has most certainly provided a focus point of IT planning. All agencies, entities and professionals in the Commonwealth community recognize the CIM as an organization which attempts to provide long-term strategic planning toward IT at the Commonwealth. The CIM has also been acknowledged, based upon our data collection activities, as an organization which obtained the participation of seasoned IT professionals.

Other achievements in IT attributable to the CIM include the development and



communication of an agency-level IT planning process and a project to pursue the year 2000 non-compliance issue at the Commonwealth. These initiatives were of value to the Commonwealth and were in-line with the expectations placed upon CIM when it was first established.

There have been, however, a number of challenges associated with CIM and the fulfillment of its charter. The first and most obvious is the lack of long-term planning which actually has follow through. The CIM has no authority to enforce or police technical standards or adherence to a planning process. As a result, the CIM cannot effectively manifest a vision down to dollars spent and professionals hired with respect to IT. This planning process, the primary reason for the CIM, has not been successful.

The other significant challenge faced by the CIM has been its relationship with the DIT. While the DIT needs IT planning and strategy and the CIM has the charter to deliver it, the relationship between the two entities has not been mutually beneficial, and, most importantly, has not been beneficial to the Commonwealth.

***Recommendation (G21). The General Assembly may wish to abolish the Council on Information Management, and assign all information technology planning and standards functions to the Office of the Chief Information Officer. The Chief Information Officer should be provided with adequate staff and other resources to carry out the information technology planning function.***

#### **4.6.2. CIO Responsible for Strategic Planning**

The CIO would have responsibility for developing an IT plan for the Commonwealth. The plan is to provide direction for both the agencies and the DTS. The agency plans would be developed in cooperation with agency IT management and created, in part, during the TSC meetings.

Specifically, the CIO would have responsibility for the following:

- Develop a comprehensive Commonwealth IT plan for the acquisition, management and operation of IT hardware, software and personnel at both DTS and the agencies.
- Develop a set of comprehensive standards for use Commonwealthwide (more detail is provided below).
- Ensure concurrence between the overall strategic plan and vision for the Commonwealth, the distinct agencies and the IT plans with respect to each.
- Monitor trends and advances in IT and update standards appropriately.

##### **4.6.2.1. Standards Setting Process**

Part of the CIO's and agency technology managers' responsibility is setting standards. Technology standards represent a select technology/product/process within a given element or class. The intent is to provide standardization such that support, training and



operational costs are minimized. Use of more than one technology/product/process tends to increase costs without commensurate benefits.

**Table 20. Incremental Costs of Supporting Additional OA Suites**

	Job	Labor	Hours Needed		Total Cost		Section Subtotal	
Task	Title	Rate	Best Case	Worst Case	Best Case	Worst Case	Best	Worst
Planning and Coordination								
Planning	IS managers	\$42	16	40	\$672	\$1,680		
Product review and introduction	IS specialist	\$36	40	80	\$1,440	\$2,880		
Vendor liaison	IS specialist	\$36	20	40	\$720	\$1,440		
Coordination of installations	IS specialist	\$36	25	50	\$900	\$1,800	\$3,732	\$7,800
Acquisition								
Forgone licensing discounts (5% to 15%)					\$49,375	\$148,125		
IS purchasing function labor	IS specialist	\$36	24	80	\$864	\$2,880		
Purchasing department labor	Purchasing	\$28	10	30	\$280	\$840		
Legal review	Legal counsel	\$150	5	10	\$750	\$1,500	\$51,269	\$153,345
IS Preparation (22 support staffers)								
Formal/casual learning-support staff	IS support staff	\$36	368	560	\$13,248	\$20,160		
Update help desk knowledge bases	IS specialist	\$36	40	80	\$1,440	\$2,880		
Purchased knowledge bases	Third party				\$12,000	\$30,000	\$26,688	\$53,040
Installation								
Technician travel time	IS specialist	\$36	50	100	\$1,800	\$3,600	\$1,800	\$3,600
Template Building								
Ten templates	IS specialist	\$36	80	160	\$2,880	\$5,760	\$2,880	\$5,760
Training the End User								
Build/buy JITT materials	IS trainer	\$36	60	100	\$2,160	\$3,600		
Build/buy classroom material	IS trainer	\$36	40	80	\$1,440	\$2,880		
Deliver classroom training	IS trainer	\$36	384	576	\$13,824	\$20,736	\$17,424	\$27,216
Additional Technical Support Burden								
Help desk calls (0 additional calls)	IS specialist	\$36	0	0	\$0	\$0		
Tier 2 support calls (1 or 2; 20 mins.)	IS specialist	\$42	495	990	\$20,790	\$41,580		
Peer support calls (2 to 4; 6 mins.)	End user	\$28	300	600	\$8,400	\$16,800		
End-user disruption	End user	\$28	500	1,000	\$14,000	\$28,000	\$43,190	\$86,380
Administrative Tasks								
Maintaining inventory system	IS clerical	\$28	16	40	\$448	\$1,120	\$448	\$1,120
Total			2,473	4,616	\$147,431	\$338,261		

Source: Gartner Group

Gartner Group research shows that an additional application suite can cost more than \$338,000 per year for a user base of 2,500 (see the table above). Although we advise agency technology managers not to focus cost-reduction efforts on forcing every department within an agency to adopt a homogeneous desktop environment, these managers can easily justify using some degree of standardization when managing the deployment of multiple application suites and desktop platforms.

An example of an element/class is word processing (we would use the term element moving forward). A standard would be one commercially available product in this set, such as Microsoft Word or Word Perfect. Selecting one of these constitutes a standard.

The process recommended for standard setting at the Commonwealth is as follows:

1. Confirm the element list for the Commonwealth. The recommended list via this report is as follows:



- Application servers
  - Network servers
  - Desktop/client platforms
  - Physical network topology/architecture
    - » Network protocols
  - Database management system
  - E-mail client
    - » Workgroup applications development tool.
2. Establish a set of up to three standards within each element. These standards would be in use Commonwealthwide, and would take as candidates any available IT products. The responsibility for setting the standards would reside with the agency IT manager and the CIO, with the CIO having final authority over the decision. Each agency would select one standard, for use agencywide, to the extent possible. The agency IT manager would have authority for making this decision, but should seek input from the end user and agency management team.

#### **4.6.3. Agency Information Technology Managers Link Strategic and Agency Planning**

Linkage of DTS and the agencies is fundamental to the entire success of the recommendation set made via this report. Our approach to creating this structure is to provide each agency IT manager with the opportunity to provide input into the decisions, standards and plans which combine to create the overall Commonwealth IT environment. We view the input from the agencies as a critical success factor to the success of this new paradigm Gartner Group is presenting. This input was lacking in the current CIM scenario in existence now.

##### **4.6.3.1. Technology Services Council (TSC)**

The TSC would be composed of two agency IT managers from each secretariat selected for four-year terms. The members serve based on a rotating staggered scheme. For example, the two representatives from Administration might be from General Services and Accounts, the first serving two years the latter three. When the General Services representative's term is over, another agency, within the Administrations Directorate, would send its IT manager. This representative would serve four years. This scheme, we believe, provides maximum exposure and cross-pollination. This committee would be chaired by the CIO.

Also included on the council would be four representatives from local governments, three local IT professionals (as with CIM currently), two representatives from the judicial branch, two representatives from the legislative branch, and three representatives from the institutions of higher education. The CIO would appoint the local IT professionals while the other entities would have responsibility for appointing their own



representatives.

The purpose of the committee is to set standards, plans and strategies for IT Commonwealthwide. The notion is to put in place those centralized facilities which would be of use to all agencies and the DTS. The committee should meet monthly. The subject of the meetings would vary, but should follow a rotating schedule approximately as follows:

**Table 21. Technology Services Council Meeting Topics**

Meeting	Topics Discussed
1 <sup>st</sup> , 5 <sup>th</sup> and 9 <sup>th</sup> month	<ul style="list-style-type: none"><li>– Agenda for upcoming meetings</li><li>– Office automation standards</li><li>– Desktop outsourcer strategy</li><li>– PC configuration standards</li><li>– Procurement to support the above</li></ul>
2 <sup>nd</sup> , 6 <sup>th</sup> and 10 <sup>th</sup> month	<ul style="list-style-type: none"><li>– Client/server operations: OS, practices, usage</li><li>– IBM mainframe operations</li><li>– Unisys mainframe operations</li><li>– Network server strategy</li><li>– Procurement to support the above</li></ul>
3 <sup>rd</sup> , 7 <sup>th</sup> and 11 <sup>th</sup> month	<ul style="list-style-type: none"><li>– Applications development</li><li>– Procurement to support the above</li></ul>
4 <sup>th</sup> , 8 <sup>th</sup> and 12 <sup>th</sup> month	<ul style="list-style-type: none"><li>– Network strategy issues</li><li>– WAN and MAN operations</li><li>– Planning and funding to support the above</li></ul>

Source: Gartner Group

***Recommendation (G22). As a part of the new structure for information technology, the Virginia General Assembly may wish to create a Technology Services Council to advise and assist the Chief Information Officer in the development of plans, standards, and policies related to information technology. Membership of the Council should consist of the Director of the Department of Technology Services, two agency information technology managers from each secretarial area, one agency technology manager each from the judicial and legislative branches, three information technology managers from State-supported institutions of higher education, and three information technology professionals from local government. Members from executive branch agencies and local governments should be appointed by the Governor for four-year, staggered terms. The Council should be chaired by the Chief Information Officer.***



#### **4.6.4. Links to Technology Funding and Procurement**

Funding for IT projects can require three plus years. The political nature of the Commonwealth can change several times during such an investment period. Additionally, the Commonwealth recognizes the need to track and monitor long-term IT projects, in an attempt to understand changes in technology usage and how this might impact a centralized IT group moving forward.

A critical set of recommendations then centers on the ability to link the IT plans at the agencies with that of the overall state. This directorate, then, should have the following responsibilities (specifically the planning and standards operation).

All IT projects, with expenditures of more than \$50,000 should be approved by this operation before funding would be allowed. A project would be submitted to the Planning and Standards Division in the form of a project plan. This project plan would include cost detail, project milestone dates, key personnel, and other key project information.

This Division would review the project plan for consistency with state standards, opportunities for leverage of centralized computing resources, overall fit and functionality and other criteria. The agency IT manager submitting the project would champion the project through this operation, and have greater authority than the Planning and Standards Division.

Once the Planning and Standards Division has reviewed the project plan, a recommendation would be made to the CIO. The CIO then would have the authority over approving the plan. If the plan is approved, then the CIO would notify the Department of Planning and Budget to release the funding as appropriate.

#### **4.7. ORGANIZATION OF AGENCY INFORMATION TECHNOLOGY OPERATIONS**

At the beginning of this report, we presented a table of IT expenditures. Of the interesting points which can be garnered from the figure, perhaps the most significant, is the amount of money spent at the agency level. Clearly, much IT investment occurs at this level.

Our data collection efforts illustrated a number of different management and organizational strategies at this level. The larger agencies typically have a large IT organization which provides operations, local network support, end-user support, applications development and planning. Also part of these IT groups at these larger agencies is some type of linkage to DIT for day-to-day operations, typically in the form of a job scheduler. With the exception of this linkage, these operations are fairly typical of IT organizations found in public and private organizations.

The smaller agencies typically have a leaner IT group. Any concentration of personnel tends to center around the end-user support and local area network support areas.



These agencies typically rely on the DIT for a greater portion of their host processing needs, utilizing the IBM (and to a much lesser degree Unisys) as the operations vehicle. The majority of the investments are made in local area network servers, personal computers and other office automation items.

In this section of the report, we provide a template organization which can be used by each agency. The template outlines both an organization, complete with reporting relationships, and also responsibility statements. We believe the latter is more important to the overall success.

***Recommendation (G23). As a part of the restructuring of the information technology function for State government, each State agency should conduct a self-assessment of its information technology organization. The assessment should evaluate the extent to which the agency information technology model proposed by the Gartner Group is appropriate for the agency.***

#### **4.7.1.1. Agency Information Technology Organization (AITO)**

We begin our discussion with a definition of the AITO. An AITO is the IT-providing organization within a particular agency. In some agencies, the IT capability is provided across several different organizations or groups in separate and distinct major organizations (within a particular agency). In these cases, there may in fact be little intercommunication between the two.

Whether separate or whole, the IT capability at an agency is termed AITO. The second definition we create is that of the AITO manager. This individual has overall responsibility for IT capability at a particular agency and hence has all resources, human and capital, in his or her span of control. This professional has a role to play at DTS as well (described elsewhere in this report).

Implicit in the two definitions above are a set of recommendations or guidelines which are summarized as follows:

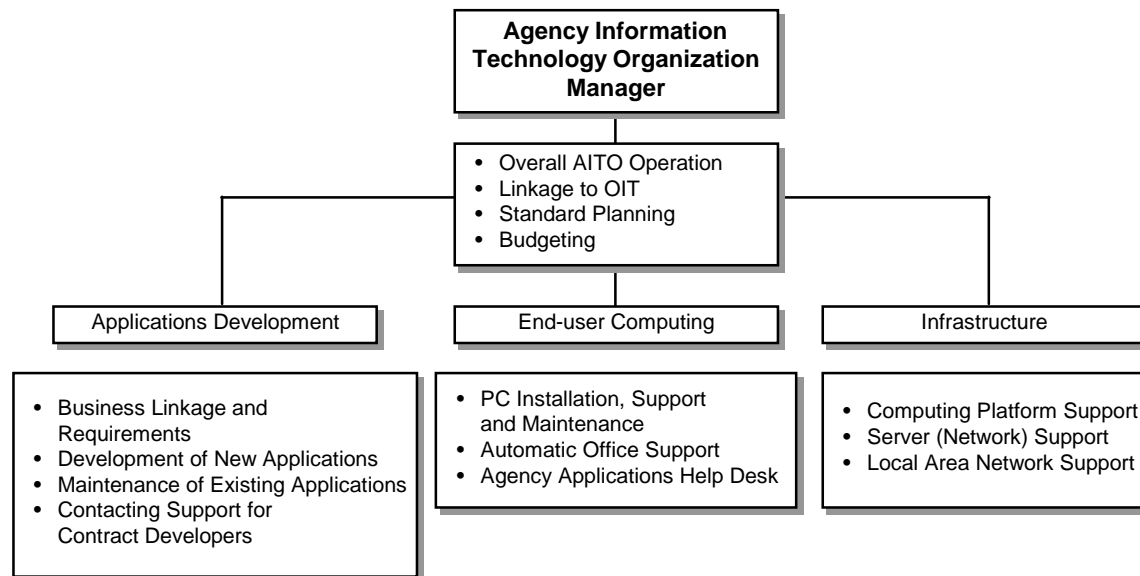
- All IT capability at the agency should be organized into one distinct group; from the Commonwealth's perspective the group is termed an AITO. From the agency's perspective it is termed the IT Organization.
- This group is to be directed by an AITO Manager and would have total responsibility for the IT provided.
- The AITO Manager would report to the director of each agency. This reflects the importance that IT plays in an agency's operation.

#### **4.7.1.2. Agency IT Structure**

We are recommending a template structure for IT operations in state agencies below. Ideally, each of the major divisions would have a single person named. We recognize this may not be feasible. The importance of this exercise is the acknowledgment, by



each agency, of these distinct and important functions.



Source: Gartner Group

**Figure 46. Agency Information Technology Organization**

- **Applications Development**—this group would have responsibility for designing, developing and maintaining the applications necessary for the operation of each agency. Most agencies have this function now. This group (or division) would garner the requirements of the business (agency) for applications as needed, develop the necessary technical specifications, develop the program logic, properly implement the application, and provide maintenance as necessary. This group is free to obtain outside assistance as possible, whether through an external contractor or DTS. Obviously, packaged applications are to be considered when implementing new functionality through IT.
- **End-user Computing**—the advent of PCs and office automation has lead to the condition of every professional having a PC of some type. Most professionals now have a PC or a terminal which is used daily in the course of their work. Proper support of the PCs is critical to the success of the AITO. Support includes PC acquisition, installation and hardware support. Also, it includes office automation software standards selection, installation and support. In short, this group has responsibility for every aspect of computing which deals directly with the end-user computing environment.
- **Infrastructure**—this group is responsible for any computing platform which resides at the agency level. As such, the group is responsible for selection, implementation, operation and support of any and all computing platforms. This group also has responsibility for the servers, including selection of server operating system (we recommend one statewide), administration of the server, user management and the like. Also, any operators utilizing computing resources



at DTS are also located within this group. Lastly, this group has responsibility for infrastructure support and servers. This includes all physical plant/wiring, hubs, connections, etc. and connections to the statewide area network.

- AITO Office—headed by the AITO Manager, this group has responsibility for planning, interfaces with DTS, procurement and other administrative functions related to IT at the agencies.

The table below provides a summary of the AITO responsibilities:

**Table 22. Agency Information Technology Organization Responsibilities**

Group/Division	Responsibilities	HW/SW	Interface with DTS
<b>Applications Development</b>	<ul style="list-style-type: none"> <li>• Business requirements</li> <li>• Detailed design</li> <li>• Program coding</li> <li>• Implementation</li> <li>• Maintenance of Applications</li> </ul>	<ul style="list-style-type: none"> <li>• Packages SW applications</li> <li>• Development tools</li> </ul>	<ul style="list-style-type: none"> <li>• AD tools standards</li> <li>• Procurements assistance</li> <li>• Client/server design techniques</li> </ul>
<b>End-User Computing</b>	<ul style="list-style-type: none"> <li>• PC installation, support and maintenance</li> <li>• OA packages selection, installation and support</li> <li>• Agency applications help desk</li> </ul>	<ul style="list-style-type: none"> <li>• PC Operating Systems</li> <li>• OA packages</li> <li>• Personal computers</li> </ul>	<ul style="list-style-type: none"> <li>• Standards</li> <li>• Desktop support contract</li> <li>• Procurement assistance</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>• All computing platforms</li> <li>• Installation, support maintenance</li> <li>• Network servers</li> </ul>	<ul style="list-style-type: none"> <li>• Platforms</li> <li>• Server</li> <li>• Server and Platform OS and System Software</li> </ul>	<ul style="list-style-type: none"> <li>• Desktop support contract; may include server content</li> <li>• Procurement assistance</li> </ul>
<b>AITO Office</b>	<ul style="list-style-type: none"> <li>• Overall AITO operation</li> <li>• Planning and standards maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Standards</li> </ul>	<ul style="list-style-type: none"> <li>• Key linkage between agency and DTS</li> <li>• Establishes direction for DTS</li> </ul>

Source: Gartner Group

#### **4.7.1.3. AITO Model Usability**

This model has been proposed as a template for use statewide, and is designed to give some construct and definition to the many responsibilities a given IT organization has. As such, this model is perhaps best suited for the largest agencies, the top twenty or so in terms of IT dollars spent. In fact, some agencies already have an organization similar to this model; Taxation, ABC and Corrections all have organizations which are in line



with this model.

We do also recommend, however, that this model be adopted for use at all agencies, where responsibilities are parsed as outlined above. At many of the agencies, we expect that the actual number of FTEs which have responsibilities in each of the areas above may only be one (or even less than one). This for the small agencies. Even at these small agencies, such an organization of resources would result in higher productivity and an overall better level of service.



**APPENDICES**



## **4.1 GLOSSARY**



## Glossary

AITO	Agency Information Technology Organization
ATM	Asynchronous Transfer Method
BIC	Best in Class
BRP	Business Recovery Plan
BSE	Best Standard of Efficiency
CAPS	Collection Account Processing System
CIM	Council on Information Management
CISC	Complex Instruction Set Computer
CMOS	Complementary metal oxide semiconductor
CNOS	Central Network Operating System
CPU	Central Processing Unit
C/S	Client/Server
CTN	Commonwealth Telecommunications Network
DASD	Direct Access Storage Device
DB2	Database 2
DBMS	Database Management System
DGS	Department of General Services
DIT	Department of Information Technology
DMA	Direct Memory Access
DMV	Department of Motor Vehicles
DOT	Department of Transportation
DBP	Department of Budget and Planning
DPT	Department of Personnel and Training
DSS	Department of Social Services
DTS	Department of Technology Services
EDI	Electronic Data Interchange
ESP	External Services Provider
ESPG	External Services Providers Government
FTB	Franchise Tax Board
FTE	Full Time Equivalents
GAO	General Accounting Office
IHRIS	Integrated Human Resources Information System
IMS	Information Management Systems



IT	Information technology
ISSC	Integrated Systems Solution Corp.
ISV	Independent Software Vendor
IT	Information Technology
JIT	Just in Time Training
JLARC	Joint Legislative Audit and Review Commission
JMU	James Madison University
LAN	Local Area Network
MACs	Moves, Adds, Changes
MAN	Metropolitan Area Network
MEL	Maximum Employment Level
MIPS	Million Instructions Per Second
MPN	Multiprotocol Network
MVS	Multiple Virtual Storage
NSM	Network and Systems Management
DTS	Department of Technology Services
OLTP	Online Transaction Processing
OS	Operating System
P-Card	Procurement Card
PASS	Pass-Through Entity Automated Screening and Support System
PBP	Performance-Based Procurement
PBX	Private branch exchanges
RDB	Relational Database Systems
RFI	Request for Information
RFP	Request for Proposal
ROI	Return on Investment
SI	Systems Integration
SIPPS	Single In-Line Pin Package
SLA	Service Level Agreement
SNA	Systems Network Architecture
TCO	Total Cost of Ownership
TSC	Technology Services Council
VT	Virginia Tech
WAN	Wide Area Network
WTA	Workforce Transition Act



**4.2 STUDY MANDATE  
LANGUAGE**





## Study Mandate Language

### Item 14 of the 1996–1998 Biennial Appropriation Act

The Joint Legislative Audit and Review Commission shall conduct a study of data processing services for state agencies and institutions, including the feasibility and advisability of privatizing the state data center located at the Department of Information Technology. As part of the study the Commission shall: 1) evaluate the effectiveness of statewide information technology planning and standards, including the mission and operations of the Council on Information Management; 2) assess the scope and utility of current data center services, including the feasibility of further consolidation of state data processing systems; 3) evaluate the effectiveness of using multiple main frame platforms; 4) determine the short- and long-term costs associated with privatization of the data center as well as continued operation by the state; 5) examine the various forms or levels of privatization which could be used; 6) assess the impact on agencies and institutions using DIT services; and 7) examine the methods for managing the risks associated with privatization of critical data processing systems. To complete its work, the Commission may employ any consulting services it deems necessary. Expenses for such services shall be funded from a separate appropriation for the Commission from the Computer Services Internal Services Fund, in the amount of \$450,000. All agencies of the Commonwealth shall cooperate with the Commission in the completion of this study. The Commission shall make an interim report to the Governor and the General Assembly no later than January 1, 1997, and a final report no later than January 1, 1998.



### **4.3 GARTNER GROUP OVERVIEW**



## GARTNER GROUP OVERVIEW

Gartner Group is the world's leading provider of IT advisory and market research services, with revenues of U.S.\$395 million in FY96.

Founded in 1979, Gartner Group provides vital advice to professionals making key decisions about IT. Our products and services include:

- Qualitative research and analysis on trends and developments
- Quantitative market research
- Benchmarking
- Consulting services
- Computer-based training products
- Worldwide conferences and events.

The company is headquartered in Stamford, Connecticut, with other major business and research centers in Atlanta, Boston, Chicago, San Jose, Europe (Egham, U.K. and Milan, Italy) and the Pacific Rim (Brisbane, Hong Kong, Singapore and Tokyo). Overall, Gartner Group has offices and distributors in 40 countries on six continents.

Our clients are IT asset managers who need to identify opportunities and avoid pitfalls in their organizations and markets. Clients include more than 7,400 major corporations and public sector organizations worldwide, more than 600 vendors of hardware, software and services and more than 100 major institutional investors.

In November 1995, Gartner Group acquired Dataquest, a leading IT market research firm. Dataquest's extensive coverage of the IT market for vendors is a perfect complement to our services targeted at users of IT.

### Services

Gartner Group offers four sets of services:

- Continuous Services
- Interactive Services
- Conferences and Events
- Consulting Services.



## Continuous Services

Gartner Group Continuous Services are unique in the IT industry. They combine bottom-line, business-oriented analysis with information and recommendations related to technology strategies.

The extraordinary knowledge and experience of Gartner Group's analysts are critical to the quality of our products and services. Gartner Group's and Dataquest's research analysts, currently numbering more than 400, constitute a unique gathering of the world's leading IT experts. No other company possesses our level of talent, insight, experience and depth in IT knowledge.

Our research spans the entire spectrum of IT:

- Hardware and operating systems
- Systems software
- Networking technologies
- Advanced technologies
- End-user computing
- Electronic workplace
- Benchmarking
- Best practices.

In addition, our research targets a broad range of recipients including IT professionals, IT managers, chief information officers, chief financial officers and executives from a wide range of company sizes and industries worldwide.

Our research is pursued through a dynamic process that frames issues, forms hypotheses, challenges assumptions and draws conclusions. Findings are presented in a form that is easily digested by clients, yet has been proven to be highly accurate, precise and actionable. Our unique analytical abilities make us an indispensable tool for IT professionals.

Vendors of IT systems and products also use our services as a source of information on new architectural trends and markets, competitive products, buying trends, user preferences and evolving market needs.



## Interactive Services

Electronic access to research and analysis is available through a variety of mediums. These services include:

- Gartner CD-ROM
- GartnerFLASH
- Gartner Group Learning
- Gartner on Lotus Notes
- Dataquest on Demand CD-ROM
- Dataquest Interactive
- Gartner First! Daily
- GartnerWeb
- @vantage
- Dataquest NewsTakes
- MarketView
- Talking Technology.

## Conferences and Events

Gartner Group annually hosts more than two dozen conferences and annual symposia in the United States, Europe and the Pacific, and numerous seminars, briefings and videoconferences. Gartner Group also holds a number of vendor exhibitions that give clients hands-on experience with the newest and most innovative products, services and full business solutions for IT decision makers worldwide.

Dataquest sponsors over a dozen industry conferences worldwide each year, along with numerous seminars and briefings.

## Consulting Services

The mission of Gartner Group Consulting Services (GGCS) is to assist clients in the business and application of IT products and services. We have the unique advantage of being able to leverage analyst experience and the primary research of our continuous service areas. In this respect alone, we provide a considerably higher level of service than many other IT consulting firms.

The Gartner Group organization includes more than 100 consultants worldwide. Recent acquisitions of two consulting units (Dataquest and NOMOS Ricerca of Milan, Italy) have enabled Gartner Group to adapt to changing needs and gain a stronger presence in Europe and the Asia Pacific region. Gartner Group supports the custom consulting needs of clients through two groups: Technology and Applications Strategies (end-user consulting) and Vendor Consulting.



## Technology and Applications Strategies

The Technology and Applications Strategies (TAS) group is focused primarily on helping clients develop their enterprise IT strategies and plans as related to the needs of the business. Typical TAS engagements involve some or all of the following elements:

- Review of existing architecture
- Development of new architecture
- Assessment of strategy, environment, vendor offerings, existing and proposed application portfolios
- Consolidation of data center and networking environment
- Development and/or evaluation of requests for proposals (RFPs).

TAS is divided into four practice areas, or primary areas of expertise:

- Applications and Data Strategies
- Network Strategies
- Distributed Computing Strategies
- Management Strategies.

## Vendor Consulting

Vendor Consulting offers an extensive array of capabilities designed for clients who need to understand the business of IT, including vendors, government and financial institutions. Highly leveraging worldwide databases, primary research and expertise of analysts and consultants, Vendor Consulting delivers analysis and advice to clients. Typical projects include the following:

- Competitive analysis of vendor image and positioning
- Development and assessment of market entry strategies in regional and global markets
- Customer perceptions of user needs and requirements.



## ABOUT GARTNER GROUP CONSULTING SERVICES

According to a client satisfaction survey recently conducted by an independent third party, clients select Gartner Group Consulting Services (GGCS) for the following reasons:

- GGCS has the base of knowledge to address their technical and strategy issues as evidenced by our continuous services, research databases, benchmarking databases, conferences and word-of-mouth references.
- GGCS is seen as a better alternative to the larger consulting firms due to the quality of staff assigned to projects, specificity of results, faster completion times, cost and objectivity (no downstream implementation services).
- The value and credibility of the Gartner Group name in association with the information, recommendations and strategies submitted to senior management is enormous.

The consulting work products are integral to our clients in their management decisions related to:

- Deployment of IT resources in support of strategic business initiatives
- Development of architectural or other technical strategies
- Formulating and/or examining alternatives pertaining to IT resources
- Improving the alignment of IT resources to support specific tactical or strategic operating objectives, including:
  - Business process re-engineering
  - Cost-reduction programs
  - Organizational restructuring
  - Outsourcing.

Specifically, GGCS provides:

- A focus on long-term planning and technical architectures.
- A unique and robust methodology. Our methodology indicates an understanding of the requirements of a long-term plan and presents a road map for attaining a client's goal. In addition, our use of a standard model for architecture development reduces the risk of architectural oversight or project delays.
- A team whose members are balanced among: 1) management and technical consulting, 2) information technology assessment, 3) strategic analysis, 4) market planning and 5) primary research.
- Nationally known professionals in the key technical areas required for the project. Gartner Group professionals are highly respected in the industry and provide proven expertise.



## **4.4 REAL DECISIONS OVERVIEW**





# REAL DECISIONS

A GARTNER GROUP COMPANY

## Corporate Overview

Real Decisions is the premier worldwide provider of IT continuous improvement services. The company has over 20 years of experience in benchmarking services and has compiled a client database representing more than 500 organizations. Real Decisions has more than 100 analysts worldwide with extensive business, IT, and quantitative science management experience.

Our goal is your goal: to achieve measurable annual improvement that can be used as a reliable basis for decision making and be readily communicated to senior management. So we take nothing for granted. The Real Decisions continuous improvement process is a step-by-step method of measurement, comparison and improvement.

Real Decisions is a key part of Gartner Group, the world's leading independent advisor of research and analysis to business professionals making information (IT) decisions, including users, purchasers and vendors of IT products and services.

Real Decisions was founded in 1975 to benchmark the time-sharing environment in data centers. In the 1980s, it added services to analyze wide area networks. Gartner Group purchased Real Decisions in January of 1994.

## Mission Statement

To provide our clients with a comprehensive, consistent and rigorous set of services that serve as their foundation for IT continuous improvement programs.



# REAL DECISIONS

A GARTNER GROUP COMPANY

## Real Decisions as Part of Gartner Group

Real Decisions is a key part of Gartner Group, the leading provider of IT advisory services in the world. Real Decisions provides Measurement and Evaluation of Technology services. Other complementary Gartner Group product lines include:

- Management of Technology
- Application of Technology
- Direction of Technology
- Market Research on Technology
- Training on Technology

Our fusion with Gartner Group links us directly to more than 430 analysts around the world who can help you implement IT continuous improvement. No other company in the world can offer the same level of business competitive advantage in IT.



What that means to you is exceptional breadth and depth of expertise, and a unique combination of services that can advance your IT organization through every stage of its ongoing development measurement, monitoring, planning, development, and training.



## **4.5 BENCHMARK DETAIL**



## Benchmark Detail Information

Anyone interested in the full benchmark report is invited to contact JLARC to request a copy. Five benchmarks were performed, listed as follows:

1. Real Decisions Data Center Benchmark—performed on DIT's data center operation.
2. Real Decisions Data Center Benchmark—performed on Virginia Tech's data center operation.
3. Real Decisions Data Center Benchmark—performed on the University of Virginia's data center operation.
4. Real Decisions Wide Area Data Benchmark—performed on the Commonwealth Telecommunications Network (data components).
5. Real Decisions Voice Information Processing Benchmark—performed on the Commonwealth Telecommunications Network (voice components).